UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region I - EPA New England

Drafted: July 9, 2014
Finalized: July 17, 2014

SUBJECT: CAA Partial Compliance Evaluation of Metalor Technologies USA of North Attleboro, MA

FROM: Tom McCusker, Environmental Engineer, Air Technical Unit

THRU: Christine Sansevero, Senior Enforcement Coordinator, Air Technical Unit CMS 7/17/14

TO: File

I Facility Information

A. Facility Name: Metalor Technologies USA
B. Facility Location: 255 John Dietsch Boulevard, North Attleboro, MA 02761
C. Facility Mailing Address: Same
D. Facility Contacts: Larry Drummond, President; 508-699-8800 ext. 306
Diane George, EH&S Manager; 508-699-8800 ext. 224
Thomas Oldham, Facilities Mgr.; 508-699-8800 ext. 220
Andrew Costa, Production Mgr.; 508-699-8800 ext. 201
Chad Serrell, Engineering Mgr.; 508-699-8800 ext. 272
Larry Cali, Process Engineer; 508-699-8800
Deb Westman, EH&S Specialist; 508-699-8800
E. Date Permit Issued: Various Plan Approvals (No Restricted Emission Status or Title V Permits Issued to this Facility)
F. AFS #: 2512000175

II Background Information

A. Date of Inspection: June 26, 2014
B. Weather Conditions: Cloudy; 75 to 80 Degrees Fahrenheit
C. US EPA Representative(s): Tom McCusker
D. State Representative(s): None
E. Federally Enforceable Requirements Covered During the Inspection:
Massachusetts Air Pollution Control Regulations:
Reg. No. 7.02 - Plan Approval and Emission Limitations
Reg. No. 7.04 - Fossil Fuel Utilization Facilities
Reg. No. 7.06 - Visible Emissions
Reg. No. 7.12 - Source Registration

Federal Air Pollution Control Regulations:
40 CFR Part 60, Subpart JJJJ – Stationary Spark Ignition Internal Combustion Engines
40 CFR Part 63, Subpart FFFF – Miscellaneous Organic Chemical Manufacturing
40 CFR Part 63, Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines
40 CFR Part 63, Subpart JJJJJJ – Industrial, Commercial, and Institutional Boilers Area Sources
40 CFR Part 63, Subpart TTTTTT – Secondary Nonferrous Metals Processing Area Sources
40 CFR Part 63, Subpart VVVVVV – Chemical Manufacturing Area Sources
40 CFR Part 63, Subpart BBBBBBB – Chemical Preparations Industry Area Sources
40 CFR Part 63, Subpart CCCCCCC – Paints and Allied Products Manufacturing Area Sources

Permits:
Various Plan Approvals (No Restricted Emission Status or Title V Permit Issued)

F. Previous Enforcement Actions: A Detailed Facility Report from EPA's Enforcement and Compliance History Online Database (ECHO) indicates that there have been no CAA informal or formal enforcement actions taken against Metalor Technologies USA (Metalor) in the past five years.

III Purpose of Inspection

The Office of Environmental Stewardship's Air Technical Unit targeted Metalor for a CAA inspection. The Air Technical Unit currently has a regional initiative to inspect chemical manufacturing facilities to determine whether any relevant major source or area source national emission standard for hazardous air pollutants (NESHAP) standards involving chemical manufacturing/preparation may apply to these facilities. The last inspection of this facility was done by the Massachusetts Department of Environmental Protection (MassDEP) on May 7, 2009.

IV Facility Description

A. Company/Facility History:

Metalor is a metal reclamation facility that reclaims gold, silver, and copper as a by-product, as well as other non-ferrous metals such as platinum. Metalor also manufactures cyanide plating salts such as gold cyanide, silver cyanide, and potassium silver cyanide. Metalor has been in operation at this location since 1988. The facility began operations at this facility under the ownership of Leach and Garner Company who owned the facility from 1984 to 1988.

B. President's Name and Mailing Address:

The President of Metalor is Larry Drummond. Any correspondence from EPA regarding this partial compliance evaluation should be submitted to Mr. Drummond. The proper mailing address for Mr. Drummond is 255 John Dietsch Boulevard; North Attleboro, MA 02761.

C. Number of Employees and Working Hours:
Metalor currently employs approximately 113 employees at this location. The facility operating hours are typically 24 hours per day, five days per week, and 52 weeks per year.

D. Process Description:
In its metal reclamation operations, Metalor utilizes seven induction furnaces (all of which are electric) to melt the raw materials provided by Metalor's customers. In addition, the gold reclamation, silver reclamation, and copper by-product reclamation operations include 14 reactors, 13 reactors, and one reactor, respectively. The reactors are used to dissolve and precipitate out the precious metals. The metal reclamation operations are controlled by various dust collectors to minimize particulate matter emissions. In addition, the gold reclamation process also utilizes a venture scrubber and electrostatic precipitator (ESP) to further control and minimize particulate matter emissions. The silver reclamation process also utilizes a scrubber to control emissions. The metal reclamation operations also utilize 3 incinerators to further reclaim precious metals. The incinerators, known as the United, Consumat, and Tulsa (the incinerator manufacturers) all operate solely on natural gas. These three incinerators have been permitted by the MassDEP and have minimum temperature requirements.

In each of the three plating salt manufacturing operations, a reactor is used to make the final plating salts (gold cyanide, silver cyanide, and potassium silver cyanide). Each of the three operations is controlled by a scrubber.

A part of Metalor's metal reclamation operations also includes what it called the "platinum group metals" operation consisting of three reactors and a packed, wet scrubber for control of acid gases that is used to reclaim platinum, which is shipped to Switzerland for further processing.

Metalor maintains one boiler at this location that operates solely on natural gas. This boiler was manufactured by Cleaver Brooks and has a maximum design heat input capacity of 6.2 million British Thermal Units per hour (mmBTU/hr). This boiler was manufactured in 1980. Since this boiler only utilizes natural gas, it would not be subject to the NESHAP standard for industrial, commercial, and institutional boilers (area sources) found at 40 CFR Part 63, Subpart JJJJJJ. This boiler is not required to be permitted because the maximum design heat input capacity of the boiler is below the permit applicability threshold (for gaseous fuels, permits are required once the maximum design heat input capacity reaches 10 mmBTU/hr.) (See 310 CMR 7.02(2)(b)(15)).

Metalor maintains one emergency generator at this location. This unit was manufactured by Kohler and has a build date of July 2012. This unit operates solely on natural gas. As a stationary "spark ignition" internal combustion engine categorized as an "emergency engine" with a date of manufacture after January 1, 2009, this unit is subject to the new source performance standard (NSPS) for stationary spark ignition internal combustion engines found at 40 CFR Part 60, Subpart JJJJ. This engine is also subject to the NESHAP standard for stationary reciprocating internal combustion engines found at 40 CFR Part 63, Subpart ZZZZ; however,

since the engine meets the criteria found in Section 63.6590(c) of this subpart, the engine complies with this NESHAP standard by complying with the NSPS standard noted above.

Metalor does not maintain any metal cleaning/parts washers at this location.

V Inspection

A. Entry:

EPA CAA inspector, Tom McCusker, arrived at the Metalor facility at approximately 8:45 am. Mr. McCusker did a drive-by of the facility before entering and did not observe any visible emissions or odors. Mr. McCusker was met by Diane George, the Environmental, Health, and Safety Manager for Metalor, Thomas Oldham, the Facilities Manager for Metalor, Andrew Costa, the Production Manager for Metalor, Chad Serrell, the Engineering Manager for Metalor, Larry Cali, the Process Engineer for Metalor, and Deb Westman, the Environmental, Health, and Safety Specialist for Metalor. Mr. McCusker showed his credentials to Ms. George.

B. Opening Conference:

Mr. McCusker indicated that he would be conducting a compliance evaluation under the CAA pertaining to Metalor's metal reclamation operations, plating salt manufacturing operations, boiler operations, incinerator operations, and emergency generator operations to determine whether Metalor was operating in compliance with the various state and federal air pollution control regulations that apply to Metalor. In addition, Mr. McCusker informed the group that he wanted to discuss Metalor's "potential to emit" HAP emissions to ensure that, going forward, Metalor was properly classified as either a "major source" or "area source" for HAP emissions. A facility is defined as an "area source" for HAPs if, on a plant-wide basis, it has the potential to emit less than 10 tons of a single HAP, or less than 25 tons of a combination of HAPs. Mr. McCusker began by asking some general questions about the Metalor facility and finished by asking specific questions about Metalor's metal reclamation, plating salt manufacturing, boiler/incinerator operations, and generator operations.

For calendar year 2010 (the most recent year available), Metalor reported that it had emitted to the atmosphere approximately 3.39 tons of nitrogen oxide (NOx), 1.96 tons of particulate matter 10 microns or smaller (PM10), 0.05 tons of particulate matter 2.5 microns or smaller (PM2.5), 0.47 tons of sulfur dioxide (SO2), 1.85 tons of carbon monoxide (CO), and 0.78 tons of volatile organic compounds (VOCs).

For calendar year 2013, Metalor reported that its plantwide natural gas usage was approximately 28,317,860 hundred cubic feet (ccf).

Mr. McCusker was informed that Metalor has made one recent modification at the facility regarding the addition of a third reactor to its "platinum group metals" operation. Mr. McCusker was informed that this was done to get rid of a "bottleneck" in the operation to allow for more efficient operation of the process. Mr. McCusker was informed that emissions from this third reactor vent to the existing packed tower, wet scrubber that is used to control acid gases from the two existing reactors. Mr. McCusker asked if Metalor had coordinated with MassDEP

permitting staff regarding this modification and he was told that they had not. Mr. McCusker suggested to the group that MassDEP be notified about this modification to see if a permit/plan approval is required. Mr. McCusker was also informed that there are plans to add a new silver dissolution reactor at the facility and that Metalor already received a plan approval for this modification (Transmittal No. X241835 dated August 7, 2012.) Mr. McCusker was informed that no further additions or modifications were planned at this time.

Mr. McCusker was informed that Metalor had not conducted a "potential to emit" calculation regarding its plantwide HAP emissions and Mr. McCusker requested that such a calculation be done so an accurate determination could be made as to whether Metalor is a "major source" or "area source" for HAP emissions. MassDEP has not issued any plan approvals that restrict Metalor's HAP emissions to "area source" levels.

Responses provided by the Metalor representatives to Mr. McCusker's questions relating to the metal reclamation operations and plating salts manufacturing operations indicate that even if it was determined that Metalor were a major source of HAP emissions, Metalor would not be subject to the miscellaneous organic chemical manufacturing NESHAP for major sources, found at 40 CFR Part 63, Subpart FFFF because the subpart allows for an exemption for facilities operating under the North American Industrial Classification System (NAICS) code of 325188 regarding all other basic inorganic chemical manufacturing. The ECHO Detailed Facility Report for Metalor indicates that the only NAICS code beginning with 325 that Metalor falls under is NAICS code 325188. The additional NAICS codes and the standard industrial classification (SIC) code that pertain to Metalor are not codes that trigger applicability to this NESHAP standard.

If it is determined that Metalor is an area source for HAP emissions, it is possible that the NESHAP for chemical manufacturing at area source found at 40 CFR Part 63, Subpart VVVVVV could apply since there are trace amounts of Table 1 HAPs (e.g. arsenic, cadmium, chromium, lead, and nickel) contained in the materials processed in the metal reclamation operations. If it is determined that Metalor is an "area source" for HAP emissions, further information regarding the concentrations of the above Table 1 HAPs will be needed from Metalor to determine its applicability to this NESHAP standard.

Other responses provided by the Metalor representatives to Mr. McCusker's questions relating to its metal reclamation operations and plating salt manufacturing operations indicate that Metalor has not triggered applicability to either the chemical preparations NESHAP standard for area sources found at 40 CFR Part 63, Subpart BBBBBBB or the paints and allied products manufacturing NESHAP standard for area sources found at 40 CFR Part 63, Subpart CCCCCCC. Specifically, regarding the chemical preparations NESHAP standard, Metalor does not meet the definition of a "chemical preparation facility", as defined in this standard, because the facility is not involved in the manufacture of products or intermediates described in NAICS code 325998. Specifically, regarding the paints and allied products manufacturing NESHAP standard, Metalor is not manufacturing paints or allied products as defined in this standard.

In regards to the NESHAP standard for secondary nonferrous metals processing (area sources) found at 40 CFR Part 63, Subpart TTTTTT, it does not appear that Metalor triggered applicability to this standard. Metalor does not meet the definition of a "secondary nonferrous metals processing facility" as defined in the standard because it is not making brass and/or bronze ingots and it is not involved in secondary magnesium processing or secondary zinc processing.

C. Record Review:
Mr. McCusker reviewed some strip charts for the Tulsa incinerator (the only incinerator required to maintain strip charts for temperature) and the daily logbook maintained by Metalor for recording the primary and secondary combustion chamber temperature measurements of the United and Consumat incinerators. A review of the daily logbook indicated that Metalor staff were, for the most part, only reporting the permitted temperature requirements of the primary and secondary combustion chambers of the incinerators rather than the actual readings from the control panel. Mr. McCusker questioned the Metalor representatives on this issue and was informed that the staff were probably just rounding off the readings. Mr. McCusker requested that subsequent readings portray the actual temperature measurements from the control panel at the time the measurement is taken.

D. Plant Walk-through:
During the inspection tour, Mr. McCusker inspected the various metal reclamation operations, including the seven furnaces found in the "melt shop" and the three incinerators used to further reclaim the precious metals. Three of the seven furnaces and two of the three incinerators (the United and the Consumat) were operating during the tour. In addition, Mr. McCusker inspected the plating salt manufacturing operations and observed the various reactors and scrubbers used in these operations. Mr. McCusker inspected the Cleaver Brooks boiler and found it in operation and in reading the nameplate found that the boiler was manufactured on 12/24/80 and that it had a maximum design heat input capacity of 6.277 mmBTU/hr. Next, Mr. McCusker inspected the emergency engine and noticed that the unit did have a "Certificate of Conformity" pursuant to the NSPS standard for stationary spark ignition internal combustion engines that indicated that the unit was meeting the required emission limits of this standard. Lastly, Mr. McCusker noticed an area with various lab hoods. Mr. McCusker was informed that these lab hoods were used in association with seven small "Fire Assay" furnaces and that there were no VOC emissions associated with these furnaces and that only trace amounts of lead could potentially be emitted from these hoods.

E. Multi-media Checklist:
A multimedia checklist was completed and can be found in the inspection file.

F. Closing Conference:
For the closing conference, Metalor's President, Larry Drummond, joined the other Metalor representatives already mentioned in this report. During the closing conference, Mr. McCusker went over his inspection findings. Specifically, Mr. McCusker requested that the Metalor representatives contact MassDEP in regards to the additional reactor it installed for its "platinum

group metals" operation to see if a plan approval would be required. In addition, Mr. McCusker requested that the Metalor representatives perform a "potential to emit" calculation regarding Metalor's plantwide HAP emissions and provide that to him, along with all assumptions used in calculating the HAP emissions. Mr. McCusker informed the group that if Metalor were classified as an "area source" for HAP emissions that there was a possibility that the chemical manufacturing (area sources) NESHAP standard could apply to Metalor depending on the concentration of Table 1 HAPs (arsenic, cadmium, chromium, lead, and nickel) found in the raw materials it receives from its customers.

Mr. McCusker thanked the Metalor representatives for their time and assistance during the inspection.

VI Post Inspection Activities

None to date.

EPA NEW ENGLAND INSPECTORS' MULTIMEDIA CHECKLIST *(Rev. 8/11)*

Inspector: Tom McCusker *Date:* 6/26/14
Facility Name: Metalor Technologies *Contact:* Diane George, EHS mgr.
Address: 255 John Dietsch Blvd (STREET) North Attleboro (CITY) MA (STATE) 02761 (ZIP)
Phone No.: (508) 699-8800 ext. 224 *No. Employees:* _____ *SIC* 3341
Description of facility, including products manufactured:
Metalor is a precious metal reclamation facility that reclaims gold, silver, copper and other ~~ERRORS~~ metals.

Program name/area:	*Response*		
A. EPCRA 304, 311, 312 and 313 (Spill Notification, Chemical Inventory, Toxic Release Inventory), CAA 112(r) Risk Management Plans, CERCLA 103			
1. ***CERCLA 103,EPCRA 304*** *- Has the facility experienced any accidental or* ***unpermitted*** *releases of hazardous chemicals within the last 3 years? Provide the name of the chemical released:* ~2 years ago of copper chloride *the quantity:* *and the date:* / / was in dirt storm drain	*Yes* ✓	*No*	
2. ***CERCLA 103,EPCRA 304, 311, 312, 313*** *- In walking through the facility, do you observe any large quantities of chemicals that might be on a hazardous chemical list[1] (e.g., acids, solvents, ammonia, etc) on site? If yes, please list:*	*Yes*	*No* ✓	
3. ***EPCRA 311,312*** *- Is there more than 10,000 lbs (e.g., 20 x 55-gal drums, or 4 full pallets of bags) of a chemical with a material data safety sheet (MSDS) currently* ***stored*** *on site? If yes, describe:* Sodium Hydroxide, HCl, Chlorine	*Yes* ✓	*No*	
4. ***EPCRA 311,312*** *- Is there 500 pounds or more of any extremely hazardous substances (EHS)[1], such as hydrogen cyanide, chlorine, or hydrazine* ***stored*** *on site? If yes, describe:* Uranyl Cyanide, Chlorine	*Yes* ✓	*No*	
5. ***CAA 112(r)*** *- Does the facility* ***use*** *more than 10,000 lbs of flammable substances, or lower amounts of extremely toxic substances[1]?*	*Yes*	*No* ✓	
B. Site Security			
1. *Does the facility offer for transportation or transport hazardous material in large quantities (as described in A2, A3, A4, and A5 above)?* copper hydroxide	*Yes* ✓	*No*	
2. *If yes to B1, do they have a written Site Security Plan? (Note: The Site Security Plan could be included as part of another document such as a "Site Safety Plan.")*	*Yes*	*No*	*NA* ✓
C. FIFRA			
1. *Does the facility manufacture, distribute, import (foreign language on label), repackage, re-label, store or use* **unregistered** *pesticides (e.g., disinfectants, sterilizers, germicides, algicides, virucides, swimming pool compounds, insecticides, fungicides, herbicides, etc.)? If yes, which chemicals or products:*	*Yes*	*No* ✓	
2. *If yes to C1, are there any registration numbers?*	*Yes*	*No*	*NA*

1 See EPA's "List of Lists, **Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA) and Section 112(r) of the Clean Air Act." Oct. 2001**

D. RCRA			
1. Do you observe any containers or tanks of hazardous waste that are open or in poor condition (leaking, corroded, etc.)? *If yes, describe the waste (e.g., liquid, sludge, etc.), indicate markings on containers/tanks and the container/tank location(s):*	Yes	No ✓	
2. *Do you observe any evidence of spills or leaks or dumping to the ground, floor drains to drywells, pits or lagoons?* *If yes, note location and extent of release:*	Yes	No ✓	
E. Air: Stationary Source Compliance			
1. *Do you observe opaque smoke emitted from a smokestack (dark enough to obscure anything behind the plume) for longer than six minutes (e.g., when entering, walking, or leaving the property?* *If yes, which unit or process line (e.g., "boiler #4")?*	Yes	No ✓	
2. *Do you observe any indications that the facility has added or expanded any air-pollution emitting processes (including emergency generators)?* *If yes, ask what type of process was added?*	Yes	No ✓	
3. *Do you observe any degreasers that use any of the following cleaning solvents?* *If yes, circle all that apply: a. Methylene chloride b. Perchloroethylene (perc or PCE) c. Trichloroethylene (TCE) d. 111-Trichloroethane e. Carbon tetrachloride f. Chloroform*	Yes	No ✓	
F. SPCC			
1. *Does the facility have the potential to store more than 1,320 gallons of oil above ground in containers >= 55 gallons, **or** > 42,000 gallons (e.g., size of two rail cars) below ground (if not already regulated by underground storage regulations)?*	Yes	No ✓	
2. If yes to F1, is there a potential spill pathway to navigable waters or into the ground? *If yes, please specify:*	Yes	No	NA ✓
3. If yes to F1 and F2 above, does the facility have a professional engineer (P.E.) certified SPCC (Spill Prevention, Control, and Countermeasure) Plan?	Yes	No	NA ✓
4. If there is a discharge into the ground, is the ground discharge registered with the State?	Yes	No ✓	
G. TSCA PCB			
1. *Do you observe any evidence of spills or leaks from transformers, capacitors, or other liquid-filled electrical equipment that may contain PCBs?* *If yes, describe type of equipment and spill or leak:*	Yes	No ✓	
2. *Do you observe any other leaking PCB-containing items (equipment, drums of waste or other containers) in storage for disposal?* *If yes, where are these items being stored, and what is their condition?*	Yes	No ✓	

H. TSCA Core			
1. *Does the facility manufacture or synthesize new chemicals?* *If yes, which chemicals?*	Yes	No ✓	
2. *Do they perform research and development (R&D) at the facility?*	Yes	No ✓	
3. *Do you see chemical containers with labels indicating they were imported (e.g., written in a foreign language)?* *If yes, identify location and contents:*	Yes	No ✓	
I. Asbestos - NESHAPS			
Are there any indications of large construction/demolition/renovation projects on site?	Yes	No ✓	
J. **UST**			
1. *Does the facility store motor fuels, waste oils, and/or hazardous substances in underground storage tanks (USTs) that are <u>not</u> registered with the state?* *If yes, identify:* no USTs	Yes	No ✓	
2. *Do you observe any tanks and piping systems that do <u>not</u> have leak detection?* *If yes, identify:*	Yes	No ✓	
K. Water			
1. *Do you observe any processes with wastewater discharges?* *If yes, where does it discharge to, e.g., a treatment system, surface water body (name and type), septic, underground, or storm water system?* **[Note: If there is a discharge into a septic or an underground system inspector should ask questions in Section N]**	Yes	No ✓	
2. *Do you observe any discoloration, steam, oil sheen, foam, floatables, or odor in the wastewater (including storm water discharges) outfalls?* *If so, describe any you observed:*	Yes	No ✓	
L. Storm Water			
1. *Do you observe staining or residue in any catch basins, drains, culverts, ditches, etc., intended to convey storm water to a surface water (e.g., wetland, pond, brook, storm sewer, stream, river, etc.)?* *If yes, which surface water or storm sewer?*	Yes	No ✓	
2. *Do you observe any stormwater discharges into the ground?*	Yes	No ✓	NA
3. *Are outside material handling/storage (e.g., chemicals, waste) areas potentially exposed to or in contact with precipitation?* *If yes, describe:* shipping/receiving - 2 totes of hydrogen peroxide - covered	Yes	No ✓	NA
M. Wetlands			
1. Do you see any: streams, ponds or other water bodies; vegetated areas with standing water; or areas with mucky, peaty, or saturated (squishy) soils, that have been disturbed by waste/refuse disposal, ditching, or filling?	Yes	No ✓	NA
2. Do you observe any storage of materials (e.g., soil, waste piles, machines) near such a wetland without a silt fence or berm? If yes, briefly describe?	Yes	No ✓	NA
N. Underground Injection Control (UIC) Subsurface Wastewater Disposal			
1. Does the facility discharge wastes to drains, plumbing, or drainage systems connected to a subsurface wastewater disposal system (e.g., septic system, dry well, etc.) that are <u>not</u> registered with the state? *If yes, describe the discharge:*	Yes	No ✓	
2. If the facility performs vehicle maintenance/repair, are there drains in maintenance areas that are <u>not</u> connected to a sewer or tight tank that can receive waste fluid discharges?	Yes	No ✓	NA

corporate -44

O. Pollution Prevention

1. Do you have a system in place to track your environmental requirements and impacts, and manage those appropriately (e.g, an environmental management system, or EMS)?	Yes ✓	No

2. Many businesses have systems in place to help maintain compliance with environmental requirements, reduce waste, and save money. If you don't currently have one, we encourage you to develop such an environmental management plan for your facility.
You will shortly be getting a letter with more information about resources that can help you stay in compliance and prevent waste.

P. Recommendation: *Please describe any additional information and/or recommendations:*

Q. Follow-up

If answers to: **A1, A2, A3, A4, A5, B1, C1, D1, D2, E1, E2, E3, F1, F2, G1, G2, H1, H2, H3, I, J1, J2, K1, K2, L1, L2, L3, M1, M2, N1, N2, or O2** is "**Yes**," or if **B2, C2, F3, F4, or O1** is "**No**," please submit a copy of this checklist to your SEC or supervisor with a recommendation to refer to appropriate program .

Note - If answers to D2, L2, N1 &/or N2 is "Yes," or F4 is "No," please refer to UIC program as well.

Program Contacts

A. EPCRA 304, 311, 312 and 313 (Spill Notification, Chemical Inventory, CERCLA 103, Toxic Release Inventory) and CAA 112(r) Risk Management Plans	**MaryJane Odonnell 8-1371**
B. Site Security (Physical)	**MaryJane Odonnell 8-1371**
C. FIFRA	**Nancy Barmakian 8-1016**
D. RCRA	**MaryJane Odonnell 8-1371**
E. Air Stationary Source Compliance	**Steve Rapp 8–1551**
F. SPCC	**Denny Dart 8-1850**
G. TSCA PCB	**Nancy Barmakian 8-1016**
H. TSCA Core	**Nancy Barmakian 8-1016**
I. Asbestos NESHAPs	**Nancy Barmakian 8-1016**
J. UST	**Beth Deabay 8-1343**
K. Water	**Denny Dart 8–1850**
L. Storm Water	**Denny Dart 8–1850**
M. Wetlands	**Denise Leonard 8–1719**
N. Underground Injection Control (UIC)/Subsurface Wastewater Disposal	**Neil Handler 8-1334**
O. Pollution Prevention	**Tom D'Avanzo 8–1801**

***** For Suspected OSHA Violations *** Contact: Frank Pagliuca @ 617-565-9850**

BE AWARE THAT SOME OF THE CONDUCT DESCRIBED ABOVE COULD BE CRIMINAL. IF YOU SUSPECT CRIMINAL CONDUCT INFORM YOUR SUPERVISOR IMMEDIATELY AND CONTACT CID AT 617-918-2300

Massachusetts Department of Environmental Protection
Bureau of Waste Prevention – Air Quality

BWP AQ AP-TES

Total Emissions Statement & Hazardous Air Pollutant List

2010
Year of record

1200175
Facility AQ identifier

ortant:
en filling out
is on the
puter, use
the tab key
move your
or - do not
the return

A. Annual Total Emissions Statement

1. Facility Identifiers:

METALOR TECHNOLOGIES USA Confidential TRADE Secret filer
a. Facility name

130075
b. DEP Account number

1200175
c. Facility AQ identifier – SSEIS ID number

2. **Total Emissions** - This form calculates your facility's actual and potential emissions by adding the emissions you entered in forms for each emission unit. The results are displayed in the table below. You must validate forms for each emission unit before the results below can be complete. To enter HAP emissions, see Section D.

3. **Facility-wide Emission Limits** -- Please enter facility-wide annual or short-term emissions limits below, if any. To enter HAP restrictions, see Section D.

Pollutant:	PM10	PM2.5	SO2	NO2	CO
Actual for previous year eDEP only:	.9625 Tons	0 Tons	.3579 Tons	1.0641 Tons	1.5751 Tons
Actual for year of record:	1.9622 Tons	0.0544 Tons	0.4667 Tons	3.3860 Tons	1.8537 Tons
Potential emissions at max capacity uncontrolled:	915.9893 Tons	0.3455 Tons	20.4601 Tons	112.2379 Tons	20.5120 Tons
Facility-wide restrictions only: Facility-wide max allowed emissions – annual:	Tons	Tons	Tons	Tons	Tons
Facility-wide max allowed emissions – short term:	Pounds	Pounds	Pounds	Pounds	Pounds
Short term period:					
Basis: DEP approval number or regulation:					

Pollutant:	VOC	HOC	*Reserved*	NH3	☐ *Reserved*
Actual for previous year eDEP only:	.3842 Tons	0 Tons	0 Tons	0 Tons	Tons
Actual for year of record:	0.7772 Tons	0 Tons	0 Tons	0.0044 Tons	Tons
Potential emissions at max capacity uncontrolled:	7.6399 Tons	0 Tons	0 Tons	0.1051 Tons	Tons
Facility-wide restrictions only: Facility-wide max allowed emissions – annual:	Tons	Tons	Tons	Tons	Tons
Facility-wide max allowed emissions – short term:	Pounds	Pounds	Pounds	Pounds	Pounds
Short term period:					
Basis: DEP approval number or regulation:					

SRES 2010 – Public

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

COPY

Not done yet.

August 7, 2012

Mr. Andrew Costa
Metalor Technologies USA
255 John Dietsch Blvd.
North Attleboro, MA 02761

RE: North Attleboro
Transmittal No.: X241835
Application No.: SE-12-028
Class: NM25
FMF No.: 130075
AIR QUALITY PLAN APPROVAL

Dear Mr. Costa:

The Massachusetts Department of Environmental Protection ("MassDEP"), Bureau of Waste Prevention, has reviewed your Limited Plan Application ("Application") listed above. This Application concerns the proposed construction and operation of a silver dissolution process and scrubber at your refining facility located at 255 John Dietsch Blvd. in North Attleboro, Massachusetts ("Facility").

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control," regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-J, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP's review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator ("Permittee") must comply in order for the Facility to be operated in compliance with this Plan Approval.

1. DESCRIPTION OF FACILITY AND APPLICATION

The Permittee operates an existing metal refining facility, and has indicated the following existing Air Quality Plan Approval pertain to the Facility:

- SM-83-090 IF, → Atlas Incinerator - Removed ~ 2006-2007?
- SM-83-091 CO, –
- SM-84-069-IN, •
- SM-86-049-IF, •
- SM-86-088-IF, ✓
- 4I87117, – Industronics Incinerator - Removed Date?
- 4P88187, ✓
- 4P91047, ✓
- 4I03022, ✓
- 4P04042 ✓

The Permittee has proposed to install and operate a silver dissolution reactor, and control the emissions by capturing and destroying the pollutants with a packed bed-wet scrubber. The scrubber has a design capacity of 3,500 actual cubic feet per minute (acfm), but will be operationally restricted to 2,000 acfm in order to achieve 99% destruction efficiency. The scrubber liquid (sodium hydroxide / sodium hydrosulfide) is circulated at a rate of 85 gallons per minute. Emissions are based on 8,760 hours of operation per consecutive 12-month period.

2. EMISSION UNIT (EU) IDENTIFICATION

Each Emission Unit (EU) identified in Table 1 is subject to and regulated by this Plan Approval:

Table 1

EU#	Description	Design Capacity	Pollution Control Device (PCD)
12	Silver Dissolution Reactor	700 gallons	Packed-Bed Wet-Scrubber With Mist Eliminator

Table 1 Key:
EU# = Emission Unit Number
PCD = Pollution Control Device

C. The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 7, for the Emission Units that are regulated by this Plan Approval:

Table 7				
EU#	Stack Height Above Ground (feet)	Stack Inside Exit Dimensions (feet)	Stack Gas Exit Velocity Range (feet per second)	Stack Gas Exit Temperature Range (°F)
12	37.4	1.33	23.9	70 - 90

Table 7 Key:
EU# = Emission Unit Number
°F = Degree Fahrenheit

5. GENERAL CONDITIONS

The Permittee is subject to, and shall comply with, the following general conditions:

A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).

B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.

C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.

D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.

E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local regulations now or in the future.

F. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.

G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.

H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.

I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.

J. The Permittee shall conduct emission testing, if requested by MassDEP, in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13. If required, a pretest protocol report shall be submitted to MassDEP at least 30 days prior to emission testing and the final test results report shall be submitted within 45 days after emission testing.

K. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain "Fail-Safe Provisions," which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

7. APPEAL PROCESS

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing-filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Dan Kamieniecki by telephone at 508-946-2717, or in writing at the letterhead address.

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

Thomas Cushing
Air Permit Section
Bureau of Waste Prevention

Enclosure

ecc: N. Attleboro Board of Health
N. Attleboro Fire Department
MassDEP/Boston – Y. Tian
MassDEP/SERO - M. Pinaud, L. Black
Capaccio Environmental Engineering – A. Roland
Metalor Technologies USA – D. George

→ TC

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE
20 RIVERSIDE DRIVE, LAKEVILLE, MA 02347 508-946-2700

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

COPY

ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

February 3, 2005

Dr. David Kinneberg
Vice President of Production
Metalor Technologies USA
255 John Dietsch Boulevard
North Attleboro, Massachusetts 02761

RE: **FINAL APPROVAL OF LPA NON-FUEL EMISSIONS:**
Application No.: 4P04042
Transmittal No.: W053241
Source No.: 2441
FMF Facility ID: 131781
Action No.: E-V7

AT: Metalor Technologies USA
255 John Dietsch Boulevard
North Attleboro

Dear Dr. Kinneberg:

The Department of Environmental Protection, Bureau of Waste Prevention has determined that the referenced Limited Plan Application ("LPA"), is administratively complete and in conformance with current air pollution control practices. The Department approves LPA No. 4P04042 authorizing the operation of a new precious metal dissolution process and scrubber system at Metalor Technologies USA, (herein referred to as "facility" or "Metalor"), 255 John Dietsch Boulevard, North Attleboro, Massachusetts.

This LPA Approval is in accordance with 310 CMR 7.02(1), (3), and (4) of the Air Pollution Control Regulations ("Regulations"), 310 CMR 7.00, as adopted pursuant to M.G.L. c.111, sections 142A-142K.

Included as part of the LPA Approval are the following:

- *Stamped approved BWP AQ 01-B Application Form dated December 22, 2004,*
- *Supporting documentation dated January 25, 2005,*
- *General Conditions for Non-Fuel Emissions LPAs,*
- *Special Conditions, and*
- *Appeal Rights*

Please review the entire LPA Approval carefully as it stipulates the conditions that the facility owner/operator must adhere to for the facility to be constructed/reconstructed/altered and operated in compliance with the Regulations.

The Department has determined that the filing of an Environmental Notification Form ("ENF") with the Secretary of Environmental Affairs, for air quality control purposes, was not required prior to this action by the Department. Notwithstanding this determination, the Massachusetts Environmental Policy Act and Regulation 301 CMR 11.00, section 11.04, provide certain "Fail-Safe Provisions" that allow the Secretary to require the filing of an ENF and/or Environmental Impact Report at a later time.

Should you have any questions concerning this FINAL APPROVAL, please contact Thomas Cushing at (508) 946-2824.

Very truly yours,

John K. Winkler, Chief
Permit Section
Bureau of Waste Prevention

W/TC/

Enclosures

cc: J. Winkler

ecc: North Attleboro Board of Health

North Attleboro Fire Dept.

Dr. Ravindra Nadkarni

DEP/BWP/BC-Boston
Attn: Yi Tian

DEP/SERO
Attn: C. Tilden
L. Patriarca

SPECIAL CONDITIONS FOR NON-FUEL EMISSION LPAS

1. Metalor shall limit the number of precious metal dissolution batches as follows:
   a. 1,460 batches per month.
   b. 1,460 batches per consecutive 12-month period.

2. Metalor shall limit emissions dissolution process as follows:

Pollutant	Pounds per Month	Tons per Year
Chlorine	131	0.07
HCl	19	0.01
Sulfur dioxide	50	0.03

   Notes:
   - Tons per year are based on a consecutive 12-month period.
   - Emissions are based on 8,760 hours of operation per consecutive 12-month period.

3. Metalor shall maintain the following overall control efficiency on the scrubber system:
   - 99% by weight.

   Note: Capture efficiency shall be determined in accordance with EPA Method 204 "Criteria for and Verification of a Permanent or Temporary Total Enclosure."

4. To ensure continuous compliance with the minimum control efficiencies, Metalor shall maintain the following operational parameters on the Packed Bed Scrubber:
   - Minimum pH of the scrubbing solution: 9.5

   The scrubber shall be continuously monitored to ensure that the scrubbing solution is circulating at all times the unit is in operation. The scrubbing solution flow monitor and the pH monitor shall each be connected to an audible alarm.

5. Metalor shall take any and all measures necessary to ensure the operation of the equipment approved herein shall not result in visible emissions (i.e. zero percent opacity), excusive of uncombined water vapor. These measures may include add-on pollution control equipment and/or shutdown of the equipment while corrective actions are being employed. This provision supersedes condition 8 of the General Conditions.

6. A detailed record keeping system shall be maintained to verify compliance with all conditions of this approval.

7. The facility shall be operated in strict accordance with the application approved herein. Should there be any differences between the aforementioned application and this approval letter, this approval letter shall govern.

8. The facility shall comply with all conditions contained in this Final Approval. Should there be any differences between conditions contained in the "General Conditions" and the conditions contained in the "Special Conditions" of this Final Approval, the "Special Conditions" shall govern.

APPEAL OF APPROVAL

This Approval is an action of the Department. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts that are the grounds for the request, and the relief sought. Additionally, the request must state why the Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) must be mailed to:

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The Department may waive the adjudicatory hearing filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

→ TC

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February 3, 2005

Dr. David Kinneberg
Vice President of Production
Metalor Technologies USA
255 John Dietsch Boulevard
North Attleboro, Massachusetts 02761

RE: **FINAL APPROVAL OF LPA NON-FUEL EMISSIONS:**
Application No.: 4P04042
Transmittal No.: W053241
Source No.: 2441
FMF Facility ID: 131781
Action No.: E-V7

AT: Metalor Technologies USA
255 John Dietsch Boulevard
North Attleboro

"HRP"

Dear Dr. Kinneberg:

The Department of Environmental Protection, Bureau of Waste Prevention has determined that the referenced Limited Plan Application ("LPA"), is administratively complete and in conformance with current air pollution control practices. The Department approves LPA No. 4P04042 authorizing the operation of a new precious metal dissolution process and scrubber system at Metalor Technologies USA, (herein referred to as "facility" or "Metalor"), 255 John Dietsch Boulevard, North Attleboro, Massachusetts.

This LPA Approval is in accordance with 310 CMR 7.02(1), (3), and (4) of the Air Pollution Control Regulations ("Regulations"), 310 CMR 7.00, as adopted pursuant to M.G.L. c.111, sections 142A-142K.

Included as part of the LPA Approval are the following:

- *Stamped approved BWP AQ 01-B Application Form dated December 22, 2004,*
- *Supporting documentation dated January 25, 2005,*
- *General Conditions for Non-Fuel Emissions LPAs,*
- *Special Conditions, and*
- *Appeal Rights*

Please review the entire LPA Approval carefully as it stipulates the conditions that the facility owner/operator must adhere to for the facility to be constructed/reconstructed/altered and operated in compliance with the Regulations.

The Department has determined that the filing of an Environmental Notification Form ("ENF") with the Secretary of Environmental Affairs, for air quality control purposes, was not required prior to this action by the Department. Notwithstanding this determination, the Massachusetts Environmental Policy Act and Regulation 301 CMR 11.00, section 11.04, provide certain "Fail-Safe Provisions" that allow the Secretary to require the filing of an ENF and/or Environmental Impact Report at a later time.

Should you have any questions concerning this FINAL APPROVAL, please contact Thomas Cushing at (508) 946-2824.

Very truly yours,

John K. Winkler, Chief
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Enclosures

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North Attleboro Fire Dept.

Dr. Ravindra Nadkarni

DEP/BWP/BC-Boston
Attn: Yi Tian

DEP/SERO
Attn: C. Tilden
L. Patriarca

GENERAL CONDITIONS FOR NON-FUEL EMISSION LPAS

1. Operation - No person shall operate a facility constructed, substantially reconstructed, or altered pursuant to 310 CMR 7.02(1), (3), and (4) except in conformance with the requirements established therein and in conformance with the specific written plan approval requirements.

2. Recordkeeping - The facility owner/operator shall establish an on site recording system. All records shall be maintained up-to-date such that year-to-date information is readily available for Department examination. Recordkeeping shall, at a minimum, include:

   a) The initiation and completion dates for the proposed construction/ reconstruction/ alteration.

   b) Malfunctions - A record of all malfunctions including, at a minimum: the date and time the malfunction occurred; a description of the malfunction and the corrective action taken; the date and time corrective actions were initiated; and the date and time corrective actions were completed and the facility returned to compliance.

   c) Records shall be maintained documenting the air contaminant emission analysis supporting the response to BWP AQ 01-B Section-E items 1a, 1b, and 2.

   d) All records shall be kept on site for three (3) years from date of record and shall be made available to the Department upon request.

3. The Regional Bureau of Waste Prevention office must be notified by telephone or fax as soon as possible after the occurrence of any upsets or malfunctions to facility equipment, air pollution control equipment, or monitoring equipment that result in an excess emission to the air or a condition of air pollution.

4. The Department must be notified in writing within 30 days of commencement of construction and completion of this approved installation.

5. The Department may revoke, in accordance with 310 CMR 7.02(3)(k), any plan approval if the actual construction has not begun within two years from the date of issuance or if, during the construction, the construction is suspended for the period of one year or more.

6. Reporting - Any construction, substantial reconstruction or alteration, as described in 310 CMR 7.02(1), (3), and (4) at a facility subject to the reporting requirements of 310 CMR 7.12, shall be reported to the Department on the next required source registration.

GENERAL CONDITIONS FOR NON-FUEL EMISSION LPAS

7. This approval may be suspended, modified, or revoked by the Department if, at any time, the Department determines that the facility is violating any condition or part of this LPA Approval. The Department shall be notified in writing before any modification of the facility such as a change in raw materials or an increase in production capacity that may increase emissions.

8. Opacity, exclusive of uncombined water, shall not exceed 10% at all times during all modes of operation, including startups and shutdowns. Visible emissions or opacity that exceeds the limits set forth in this approval shall be reported to the Department in writing or by fax within seven (7) days of the occurrence.

9. Noise from the facility during construction, initial startup and routine operation, including startups and shutdowns, shall not exceed the Department noise guidelines and shall not cause a condition of air pollution as defined in 310 CMR 7.01 and 7.10.

10. The facility shall be constructed and operated in a manner to prevent the occurrence of dust or odor conditions that cause or contribute to a condition of air pollution as defined in 310 CMR 7.01 and 7.09.

11. This Final Approval does not negate the responsibility of owner/operator of the referenced facility to comply with this or any other applicable federal, state, or local regulations now or in the future. Nor does this approval imply compliance with any other applicable federal, state, or local regulations now or in the future.

12. Emission Testing - The Department may, in accordance with Regulation 310 CMR 7.13, require source emission testing ("stack testing"). All emission testing shall be conducted in accordance with the Department's Guidelines for Source Emission Testing and with 310 CMR 7.13.

13. Should asbestos remediation/removal be required because of the approved construction/reconstruction/or alteration of this facility, such asbestos remediation/removal shall be done in accordance with Regulation 310 CMR 7.15 in its entirety and 310 CMR 4.00.

SPECIAL CONDITIONS FOR NON-FUEL EMISSION LPAS

1. Metalor shall limit the number of precious metal dissolution batches as follows:
   a. 1,460 batches per month.
   b. 1,460 batches per consecutive 12-month period.

2. Metalor shall limit emissions dissolution process as follows:

Pollutant	Pounds per Month	Tons per Year
Chlorine	131	0.07
HCl	19	0.01
Sulfur dioxide	50	0.03

emission records (none) #

   Notes:
   - Tons per year are based on a consecutive 12-month period.
   - Emissions are based on 8,760 hours of operation per consecutive 12-month period.

3. Metalor shall maintain the following overall control efficiency on the scrubber system:
   - 99% by weight.

Kg factor -

   Note: Capture efficiency shall be determined in accordance with EPA Method 204 "Criteria for and Verification of a Permanent or Temporary Total Enclosure."

4. To ensure continuous compliance with the minimum control efficiencies, Metalor shall maintain the following operational parameters on the Packed Bed Scrubber:
   - Minimum pH of the scrubbing solution: 9.5

automatic controller - feeds automatica

   The scrubber shall be continuously monitored to ensure that the scrubbing solution is circulating at all times the unit is in operation. The scrubbing solution flow monitor and the pH monitor shall each be connected to an audible alarm.

5. Metalor shall take any and all measures necessary to ensure the operation of the equipment approved herein shall not result in visible emissions (i.e. zero percent opacity), excusive of uncombined water vapor. These measures may include add-on pollution control equipment and/or shutdown of the equipment while corrective actions are being employed. This provision supersedes condition 8 of the General Conditions.

6. A detailed record keeping system shall be maintained to verify compliance with all conditions of this approval.

7. The facility shall be operated in strict accordance with the application approved herein. Should there be any differences between the aforementioned application and this approval letter, this approval letter shall govern.

8. The facility shall comply with all conditions contained in this Final Approval. Should there be any differences between conditions contained in the "General Conditions" and the conditions contained in the "Special Conditions" of this Final Approval, the "Special Conditions" shall govern.

APPEAL OF APPROVAL

This Approval is an action of the Department. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts that are the grounds for the request, and the relief sought. Additionally, the request must state why the Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) must be mailed to:

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The Department may waive the adjudicatory hearing filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Process Description

The proposed process will be, as far as possible, a clone of the system installed at the Metalor facility in Marin, Switzerland.

Process Overview

Impure metal, containing less than 15% silver, is atomized to produce fine particles that are amenable to leaching. The atomized material is dissolved in hydrochloric acid using chlorine gas as the oxidant. In excess of 99% of incoming gold dissolves into solution along with PGM's and base metals. Silver in the feed dissolves and re-precipitates as silver chloride, which is removed from the gold-laden solution by filtration. Dissolved gold is reduced from solution with sulfur dioxide gas. After filtering and rinsing, the gold is melted. Solution from the precipitation contains platinum group metals, which are collected for subsequent processing.

There is synergy between the Hydrometallurgical Refining Process (HRP) and Miller/Wohlwill. The dissolved gold in spent solution from the Wohlwill cells can be precipitated in the reduction stage of the HRP while fresh solution (known as point solution) can be manufactured in the leaching stage. The presence of an HRP, with its daily routine of dissolution/precipitation, speeds up the residence time for the Miller/Wohlwill because byproduct streams are processed more efficiently.

In preparation for dissolution, feed is melted and poured through a high-pressure stream of water where it is atomized to produce a fine powder. The finer the powder, the more surface area and the faster the dissolution reaction.

Metal Dissolution

Wet atomized feed is mixed in dilute hydrochloric acid. Chlorine gas is then injected into the slurry to oxidize and dissolve gold and most other metals. Heat generated by the exothermic reaction is not sufficient to maintain the optimum reaction temperature of between 80 and 90^{0}C. A closed loop recirculation heating system will be used to maintain temperature during reaction (and preheat the solution to initiate the reaction). The reactors, arranged in parallel, will be vigorously agitated to fluidize all solids during leaching. This is particularly important when high-silver feeds are being leached as silver chloride on the surface of the particles inhibits the rate of reaction; vigorous agitation is necessary to prevent the build up of silver chloride on particle surfaces. Although this

proposal is based on using two glass-lined reactors similar to those in Marin, the suitability of less-expensive titanium reactors is being investigated.

Most of the chlorine gas injected into the reactor is dissolved in the HCl solution where it reacts with the metal. Residual chlorine creates an overpressure, which is maintained at around 1 bar by adjusting the flow rate of chlorine into the reactor. The chlorine demand, determined by the rate of reaction, drops to zero when all metal has been dissolved or further reaction is inhibited by silver chloride. This drop in demand is used to determine reaction end point. When leaching is complete, air is bubbled through the solution to displace any dissolved yet un-reacted chlorine gas before filtration. The slurry is then cooled to below 30^{0}C by flowing chilled glycol solution through the reactor jacket. Cooling the solution lowers the solubility of silver chloride, which aids in preventing post filtration precipitation of silver chloride during the gold reduction stage.

The cooled slurry is then filtered to remove undissolved metal and silver chloride. Filtrate is pumped to a reduction tank. Solid residue is washed and sent to the silver refining circuit.

Gold Reduction

Originally, it was thought that two stages of reduction would be required to reliably produced 99.99% pure gold. However, day-to-day operations in Marin have demonstrated that a single reduction step is sufficient. Nevertheless, equipment will be designed so that a two-stage reduction could be performed in the US if needed. Depending on the level of impurities, between 90 and 98% of the gold can be recovered in the first stage as 99.99% (4 9's) pure gold. The balance would then be precipitated in the second stage as an impure product that is recycled to the dissolution reactors. The reason for not recovering all the gold on one reduction stage is that overdosing of SO_2 during reduction can lead to the production of impure product. Stopping the reaction short of the end point ~~ensures~~ reduces the risk of making impure product.

The flow rate of the SO_2 will be optimized to ensure production of pure product in the shortest possible time. The end point of the reduction in both stages will be determined by monitoring solution ORP. The first stage reduction will end when the ORP drops below 700 mV at which point about 1-5 gpl of gold will still be in solution to be recovered in the second stage.

Well-agitated fiberglass reinforced Kynar vessels fitted with a bottom discharge valve will used for reduction. Good agitation will be provided to ensure complete dispersion of the freshly precipitated gold. This is

necessary to prevent the occlusion of solution in the precipitated gold mud, which can affect the final purity.

The gold produced will be filtered using a Buchner filter where it will be washed in a highly agitated dilute HCl solution using a mobile station. The gold will then be thoroughly rinsed with DI water to displace any entrained solution. The wash water containing some un-dissolved gold will be returned to the reactor.

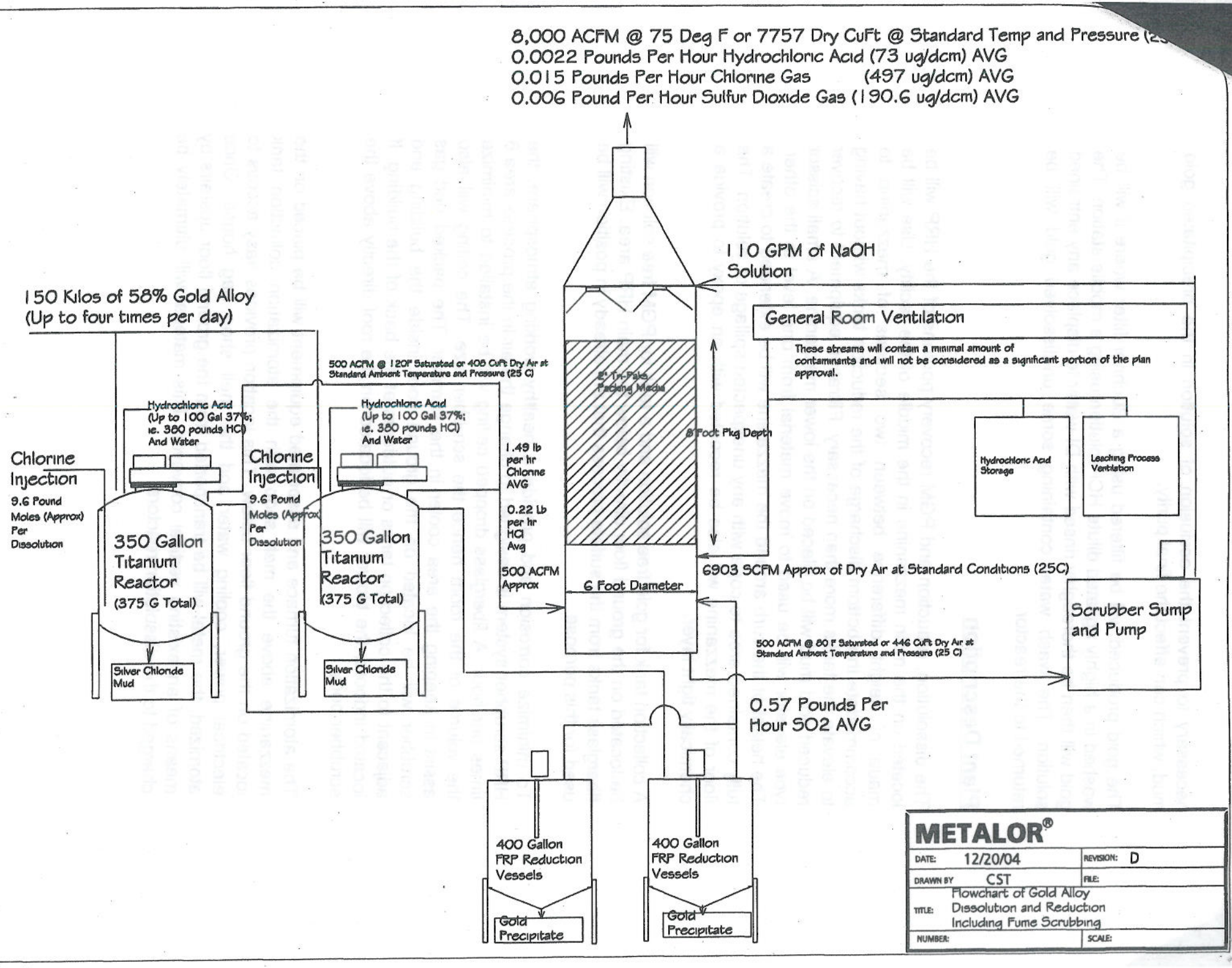
Plant Description

The dissolution, reduction and PGM recovery portions of the HRP will be located on the main mezzanine in the middle of the facility. Use will be made of height difference between two sections of mezzanine to accommodate the bottom discharge of the reduction tanks without having to elevate the tanks more than necessary. Filtration equipment to recover reduced gold mud will be placed on the lower mezzanine. A small scissor type elevator will be used to move material from one level to the other. The height of the curb around the mezzanine will be extended to create a fully contained area to cope with any unexpected spillage of solution. The floor of the mezzanine will also be recoated with an epoxy to provide a chemically tight layer.

A collection tank for gold free solution and a tank for PGM free solution will be located on the ground floor directly below the main HRP area. Existing fiberglass tanks from the sulfate process that are already in position will be used for this purpose.

To minimize corrosion and provide a healthy working atmosphere, the HRP scrubber system is designed to change the air in the process area 6 times per hour. A fiberglass dropped ceiling will be installed to minimize the volume of the room hence the scrubber size. The ceiling will also assist in keeping the area cooler in the summer. The packed bed gas scrubber will be located on the ground floor inside the building and adjacent to the collection tanks or outdoors at the back of the building. If located indoors, the blower will be located on the roof directly above the scrubber body

The atomization furnace and associated equipment will be placed on the mezzanine above the melt shop with the atomization collection tank located on the ground floor below. This location provides easy access to electrical power, cooling water and the melt shop bag house. Once atomized, the metal will be transported from the ground floor upstairs by means of an existing vertical conveyor. This material will ultimately be charged to the dissolution reactors.



METALOR®	
DATE: 12/20/04	REVISION: D
DRAWN BY: CST	FILE:
TITLE: Flowchart of Gold Alloy Dissolution and Reduction Including Fume Scrubbing	
NUMBER:	SCALE:

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE
20 RIVERSIDE DRIVE, LAKEVILLE, MA 02347 508-946-2700

December 2, 2004

Dr. David Kinneberg
Vice President of Production
Metalor Technologies USA
255 John Dietsch Boulevard
North Attleboro, Massachusetts 02761

RE: **CONDITIONAL APPROVAL**
Application for: BWP AQ 02
Non-Major Comprehensive Plan Approval
Transmittal No: W044242
Application No: 4I03022
Source No: 0175
FMF Facility ID: 130075
Action Code: E-V6

AT: Metalor Technologies USA
255 John Dietsch Boulevard
North Attleboro

Dear Dr. Kinneberg:

The Department of Environmental Protection, Bureau of Waste Prevention, has reviewed Comprehensive Plan Application (CPA) No. 4I03022, dated December 9, 2003 with additional information received on February 10 and July 19, 2004. CPA No. 4I03022 requests Department approval for the installation and operation of a precious metal reclamation incinerator at Metalor Technologies USA.

The application was submitted in accordance with Section 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control Regulations", adopted by the Department pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-J, and Chapter 21C, Section 4 and 6.

The Department's review of Application No. 4I03022 has been limited to air pollution regulation compliance and does not relieve you of the obligation to comply with all other permitting requirements.

The application was prepared and submitted by Charles Tatakis of Metalor Technologies USA over the seal and signature of Dr. Ravindra Nadkarni, P.E. No. 24659.

FACILITY/ PROJECT DESCRIPTION

Metalor Technologies USA ("Metalor") has proposed the installation and operation of one (1) Tulsa Combustion, Model CRO-6-6-15, batch fed, precious metal reclamation incinerator.

The incinerator has a maximum design capacity of 100 pounds of waste per hour. Metalor will incinerate Type 0 Waste (dry rubbish, trash), Type 5 Waste (liquid industrial waste), and Type 6 Waste (solid industrial waste), which contain precious metals.

The primary chamber will have a volume of 108 cubic feet (ft^3). The secondary chamber will have a volume of 169.2 ft^3. The primary chamber will be equipped with a Midco/ Tulsa Model J81A-3 natural gas fired burner with a maximum heat input rating of 800,000 Btu per hour. The secondary chamber will be equipped with a Midco/ Tulsa J121A-3/CRO natural gas fired burner with a maximum heat input rating of 1.2 MMBtu per hour. The secondary chamber is also equipped with an additional natural gas fired "boost" burner with a maximum heat input rating of 2.53 MMBtu per hour.

The products of combustion will be vented through a D.R. Technologies, custom manufactured quench/ venturi/ cyclone system followed by a D.R. Technologies custom manufactured packed bed scrubber unit.

Exhaust from the incinerator system will be vented through a 37-foot stack.

The Department is of the opinion that the submitted application is in conformance with current air pollution control engineering practices and hereby grants CONDITIONAL APPROVAL of CPA No. 4I03022, subject to the following descriptions, requirements, and provisions:

A. OPERATIONAL LIMITS:

1. Metalor shall limit the maximum (peak) heat rate input of the burners in the incinerator as follows:
   a. Primary chamber burner: 0.8 MMBtu/hr
   b. Secondary chamber burner: 1.2 MMBtu/hr
   c. Boost burner: 2.53 MMBtu/hr

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The application was submitted in accordance with Section 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control Regulations", adopted by the Department pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-J, and Chapter 21C, Section 4 and 6.

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   a. Primary chamber burner: 0.8 MMBtu/hr
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   c. Boost burner: 2.53 MMBtu/hr

2. Metalor shall continuously maintain the following minimum control efficiencies for the quencher/ venturi/ cyclone/ scrubber train:

   a. Capture efficiency: 100%
   b. Destruction efficiency
      - Particulate: 99% by weight
      - Gaseous: 98%
   c. Overall control efficiency
      - Particulate: 99% by weight
      - Gaseous: 98%

   Note: Capture efficiency shall be determined in accordance with EPA Method 204 "Criteria for and Verification of a Permanent or Temporary Total Enclosure." Gaseous emissions include, but are not limited to, HCl.

3. To ensure continuous compliance with the minimum control efficiencies, Metalor shall maintain the following operational parameters on the control equipment:

   a. Packed bed scrubber:
      - Minimum pH of scrubbing solution: 8.0

      The scrubber shall be continuously monitored to ensure that the scrubbing solution is circulating at all times the unit is in operation. The scrubbing solution flow monitor and the pH monitor shall each be connected to an audible alarm.

4. Metalor shall maintain the following operational parameters on the secondary chamber of the incinerator:

   a. Minimum residence time: 1.15 seconds
   b. Minimum temperature: 1,600°F

   Minimum temperature as measured by the thermocouple located on the downstream end of the combustion chamber. Minimum residence time shall be met under all operating conditions for the effective chamber volume of the incinerator. Residence time is a design criterion that is not required to be continuously monitored or recorded but may be required to be validated at a later date in accordance with the "General Requirements" contained in this approval. Records shall be maintained in accordance with "Monitoring and Record Keeping Requirements," of this approval.

5. Metalor shall ensure that the charge rate of the incinerator does not exceed 100 pounds per hour. Records of the load weight and burn time shall be maintained in accordance with Section D of this approval.

B. PRODUCTION LIMITS:

None

C. EMISSION LIMITS:

1. Metalor shall limit emissions form the incinerator approved herein, in accordance with the limitations identified in Table A, "Incinerator Emission Limitations." All annualized emission rates are based on 8,760 hours of operation per consecutive 12-month period. Monthly emission rates are based on 744 hours of operation per month. Annual and monthly emission rates established at the incinerator's maximum rated capacity of 100 pounds of waste per hour.

2. In addition to the emission limits contained in Table A, Metalor shall limit emissions of particulate matter (PM) from the stack to no more then 0.0047 grains per dry standard cubic foot (gr/dscf).

3. Hydrogen chloride (HCl) emissions shall not exceed 3.8 ppmv, corrected to 12% CO_2.

4. At no time shall opacity of the emissions from the approved incinerator exceed the following:

   a. Ten percent (10%).

   Note: Opacity is exclusive of uncombined water vapor.

D. MONITORING AND RECORD KEEPING REQUIREMENTS:

1. The approved incinerator shall be equipped with a recording device that **continuously** records the temperature of the secondary chamber. The recording device shall provide documentation of compliance with the minimum temperature requirement contained in the "Operational Limitations" of this Conditional Approval. Each copy shall indicate the date and time.

2. The opacity monitor shall be connected to an audible alarm and a recording device. The opacity-recording device shall provide document compliance with the opacity limit contained in the "Emission Limitations" section of this Conditional Approval. The documentation shall indicate date and time.

3. Metalor shall maintain copies of all maintenance records for all pollution control and monitoring equipment.

4. The packed bed scrubber shall be continuously monitored to ensure that the scrubbing solution is circulating at all times the unit is in operation. The scrubbing solution flow monitor and the pH monitor shall each be connected to an audible alarm.

5. Metalor shall maintain records that document the charge rate of the incinerator has not exceeded its maximum hourly capacity as averaged over the duration of the burn cycle. At a minimum, these records shall include the load weight and the duration of the burn cycle.

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None

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3. Hydrogen chloride (HCl) emissions shall not exceed 3.8 ppmv, corrected to 12% CO_2.

4. At no time shall opacity of the emissions from the approved incinerator exceed the following:

   a. Ten percent (10%).

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1. The approved incinerator shall be equipped with a recording device that **continuously** records the temperature of the secondary chamber. The recording device shall provide documentation of compliance with the minimum temperature requirement contained in the "Operational Limitations" of this Conditional Approval. Each copy shall indicate the date and time.

2. The opacity monitor shall be connected to an audible alarm and a recording device. The opacity-recording device shall provide document compliance with the opacity limit contained in the "Emission Limitations" section of this Conditional Approval. The documentation shall indicate date and time.

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4. The packed bed scrubber shall be continuously monitored to ensure that the scrubbing solution is circulating at all times the unit is in operation. The scrubbing solution flow monitor and the pH monitor shall each be connected to an audible alarm.

5. Metalor shall maintain records that document the charge rate of the incinerator has not exceeded its maximum hourly capacity as averaged over the duration of the burn cycle. At a minimum, these records shall include the load weight and the duration of the burn cycle.

6. Metalor shall maintain detailed records on a monthly basis and on an annual (consecutive 12-month period) basis. These records, including any other "credible evidence," shall document and demonstrate the compliance status of the facility with respect to the provisions contained in this Conditional Approval. These records shall include, but not be limited to, operational, production and emission limitations, etc contained in the approved CPA and this Conditional Approval. A consecutive twelve-month period basis is the total from the latest month plus the sum for the eleven preceding months.

7. Metalor shall maintain on-site, an up to date copy of the Standard Operating Procedures (SOP) and the Standard Maintenance Procedures (SMP) for the incinerator and the associated emission control equipment approved herein.

8. A copy of these records shall be kept readily available on site for a period of five (5) years and shall be made available to the Department and/or USEPA personnel upon request.

9. The terms "per year" and "annual" as used in this document refer to a consecutive twelve-month period.

E. TESTING REQUIREMENTS:

1. Metalor shall demonstrate to the Department that the incinerator system operates in accordance with this Conditional Approval by testing for the following parameters: minimum destruction efficiency, all specified hourly emission rates, all emission rates specified on a ppmv basis, and particulate on a grains per dscf basis. Metalor shall perform emission testing within 90 days of initial start-up of the incinerator. Department personnel shall be given the option of witnessing this compliance testing at a mutually agreed time and date.

2. A pretest protocol shall be submitted to this office, for written Department approval, at least thirty (30) days before the commencement of emission testing at the facility. The pretest protocol shall describe the following:
   a. The test methods for the emission testing,
   b. The sampling point locations,
   c. The sampling equipment,
   d. The sampling and analytical procedures,
   e. The operating conditions for the required testing, and
   f. The name of the independent third party testing company.

3. The final emissions test results report shall be submitted to this office within 60 days of completion of the test. At minimum, the final report shall include:
   a. A description of the emission compliance testing program conducted,
   b. Applicable emission limits for which testing was required,
   c. A summary of test results demonstrating compliance and / or noncompliance with applicable limits,

certain "Fail-Safe Provisions" that allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report at a later time.

The enforceable conditions contained herein establish the federally enforceable status of this **CONDITIONAL APPROVAL**. The Department reserves the right to require changes in the standard operating and/or maintenance procedure, record keeping system, and to require additional process monitoring if it is determined necessary by the Department to ensure continuous compliance with the Air Quality Control Regulations contained in 310 CMR 7.00.

This Approval is an action of the Department; you have a limited right to appeal. Please refer to the enclosed "APPEAL" information, Attachment 1.

Enclosed is one stamped, approved copy of the application submittal.

Should you have any questions pertaining to this CONDITIONAL APPROVAL, contact Thomas Cushing at the Regional Office at (508) 946-2824.

Very truly yours,

John K. Winkler, Chief
Permit Section
Bureau of Waste Prevention

W/TC/
Enclosures: Attachment 1: "Appeal of Appeal"
Table A: "Emission Limitations"

cc: J. Winkler

ecc: North Attleboro Board of Health

North Attleboro Fire Dept.

Dr. Ravindra Nadkarni

DEP/BWP/BC-Boston
Attn: Yi Tian

DEP/SERO
Attn: C. Tilden
L. Patriarca

ATTACHMENT 1

APPEAL OF APPROVAL

This Approval is an action of the Department. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts that are the grounds for the request, and the relief sought. Additionally, the request must state why the Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

The request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below.

The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

The Department may waive the adjudicatory hearing filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

TABLE A

INCINERATOR EMISSION LIMITATIONS

Pollutant	Emission Limitations				
	Monthly Limit (Tons per Month)	Annual Limit (Tons per Year)[1]	Short Term Emission Limits		
			"AP42" Emission factors[2]	Pound per hour[3]	Other
Oxides of Nitrogen	0.06	0.33	3 lb/ ton	0.075	0.08 lb/MMBtu
Carbon Monoxide	0.33	1.97	10 lb/ ton	0.45	0.08 lb/MMBtu
Particulate Matter (PM/PM_{10})	0.07	0.44		1.5	0.0047 gr/dscf
Sulfur Dioxide	0.01	0.01	2.5 lb/ ton	0.0025	
Total Organic Compounds	0.1	0.59	3 lb/ ton	0.135	
Hazardous Air Pollutants (total)[4]	0.001	0.001			
Lead	1 lb	1 lb	0.201 lb/ ton	0.0012	
HCl	0.03	0.2	44.2 lb/ ton	0.04	3.8 ppmv @ 12% CO_2

Notes:

1. The terms "per year" and "annual" are based on a consecutive 12-month period.
2. Emission factors obtained from USEPA publication "AP-42," Section 2.1, Table 2.1-12, dated October 1996, Table 2.3-16, dated January 1995, Table 4-1 (undated), and Table 2.1-8, dated October 1996.
3. Emission factors, in pounds of emissions per ton of waste, are before control. Emissions expressed in "pounds per hour" are after control, except particulate matter, which is before control and based on manufacturer's specification.
4. HAPs are as listed in the 1990 Clean Air Act (CAA) Amendments, Section 112(b).

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection
Southeast Regional Office

William F. Weld
Governor
Daniel S. Greenbaum
Commissioner

March 17, 1992

Mr. Kevin O'Neill
Metalor USA Refining Corporation
255 John L. Dietsch Boulevard
P.O. Box 255
North Attleborough, MA 02761-0255

RE: NORTH ATTLEBOROUGH--
Air Quality Control--310 CMR 7.02, Source 0175, Action Code V7, Application No. 4P90208,
FINAL APPROVAL

Dear Mr. O'Neill:

The Department of Environmental Protection has reviewed your November 7, 1990 letter (Application No. 4P90208) and revisions dated March 10, 1992, requesting a modification of your permits (application No. SM86-088-IF and 4P87047) concerning the acid fume discharge from the Reduction of Platinum Group Metals (PGM) Treatment Process at your refinery located at 255 John L. Dietsch Boulevard, North Attleborough, Massachusetts.

The application was submitted in accordance with Section 7.02 (Plan Approval and Emission Limitations) as contained in 310 CMR 7.00 (Air Pollution Control Regulations) adopted by the Department pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142A-E.

The Department's review, in accordance with 310 7.02(3), was limited to consideration of such matters which may cause or contribute to a condition of air pollution. The approval contained herein does not relieve you of the obligation to comply with all other permitting requirements.

The application was prepared by J. Kevin O'Neill, and was submitted over his seal and signature, P.E. No. 29054.

A review of your letters indicates that Metalor proposes the control of acid vapor emissions from the PGM Treatment Process by reductions in solution free acid concentrations rather than by refrigeration of process solutions as currently approved. Currently, the solution temperature is maintained below 60°C resulting in a HCl vapor pressure of 2.3 mmHg for an 18%HCl solution; it is proposed to reduce the HCl in solution to a maximum

of 6% and to operate at a maximum temperature of 800C which will result in an HCl vapor pressure of 0.39mmHg. As indicated, the HCl emissions are proportional to the HCl vapor pressure, therefore your proposal represents an HCl emission reduction. This modification will result in the following maximum combined total HCl emissions from the two (2) stacks (stacks V-14 and V-15):

Stacks	HCl ppm(v)	HCl (lb/hr.)
V-14 & V-15	18.5	0.68

The Department is of the opinion that the application as submitted is in conformance with current air pollution control practices and hereby approves of the application subject to the following provisos:

1. If, in the opinion of the Department, a condition of air pollution exists due to operation of this equipment, Metalor shall take any and all measures necessary to alleviate said condition.

2. Maximum production rate at the facility shall remain unchanged from that indicted in the previous approved applications (SM86-088-IF and 4P87047).

3. This approval in no way negates or changes any of the provisions or specifications of the previous approved applications (SM86-088-IF and 4P87047) except as indicated in this letter.

An Environmental Notification Form, for air quality control purposes, was not required for this action since it is categorically exempt pursuant to the Regulations Governing the Preparation of Environmental Impact Reports adopted by the Secretary of Environmental Affairs. This action has been determined to cause no significant damage to the environment.

Enclosed is a stamped approved copy of your application. Should you have any questions please contact John Winkler at the Regional Office (508) 946-2770.

Very truly yours,

John K Winkler for

Vaughan M. Steeves, Chief
Air Quality Control Section

S/JKW/lm
Enclosure

Pickering

PA

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Protection

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02347

DANIEL S. GREENBAUM
Commissioner

GILBERT T. JOLY
Regional Director

COPY

June 25, 1991

Metalor USA Refining Corporation
255 John L. Dietsch Boulevard
North Attleborough, Massachusetts
02761

RE: SMAPCD--NORTH ATTLEBOROUGH
310 CMR 7.02(2), PLAN APPROVAL,
Application No. 4P91047
Action E-V7, Source No. 0175,
Transmittal No. 16655

ATTENTION: Mr. Kevin O'Neill

Gentlemen:

The Department of Environmental Protection, Division of Air Quality Control, is hereby responding to your limited plan application (LPA) received on April 25, 1991, relative to a proposed modification to the "Miller" gold refining process and its associated air pollution control equipment at Metalor USA Refining Corporation, 255 John L. Dietsch Boulevard, North Attleborough, Massachusetts.

Department review of your application discloses that Metalor USA Refining Corporation is proposing to modify the existing "Miller Process" (SM83-090-IF) by installing one (1) new electric induction furnace and replacing the existing air pollution control equipment, a packed bed scrubber, with a wet electrostatic precipitator (ESP). This will bring the number of electrical induction furnaces used in the "Miller Process" to three (3) in total. The resulting potential emissions of particulate matter from the "Miller Process", after control, shall not exceed 0.15 pounds per hour nor 0.52 tons per year.

The Department has determined that the modification as proposed in this application, is in conformance with current air pollution control engineering practices and hereby approves the application provided that:

1. The Department shall be notified in writing when the "Miller Process" modification has been completed and deemed operational.

2. Should a nuisance condition occur due to the operation of the electrostatic precipitator approved herein, appropriate steps shall be immediately taken to abate the nuisance condition.

Winkler

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02347

947-1231, Ext. 680-684

Daniel S. Greenbaum
Commissioner

Gilbert T. Joly
Regional Director

October 11, 1988

Leach & Garner Refining Corporation
P.O. Box 255
255 John L. Dietsch Boulevard
North Attleborough, Massachusetts 02761

RE: NORTH ATTLEBOROUGH--Air Quality Control, 310 CMR 7.02, Code T5, Source No. 0175, Application No. 4P88187, Applicability Determination

ATTENTION: J. Kevin O'Neill

Gentlemen:

The Southeast Region of the Department of Environmental Quality Engineering, is hereby responding to your application dated July 26, 1988, relative to the proposed construction of a baghouse dust collector at 255 John L. Dietsch Boulevard, North Attleborough, Massachusetts.

The proposed baghouse will handle 6000 ACFM and will be 98.5% efficient for the collection of metal fume particulate. The baghouse will operate in parallel with a baghouse previously approved by the Department (SM86-049-IF) to improve ventilation in the metal shop.

As described, both baghouses will be exhausted through the existing stack which exhausts a maximum of:

Pollutant	Pounds Per Hour	Tons Per Year
Particulates	0.104	0.38

Department review has revealed that the proposed process equipment and associated emissions, as described are not subject to the permitting requirements of Section 7.02(2) as contained in 310 CMR 7.00 Air Pollution Control Regulations. This applicability determination is based on the equipment and emissions described in your application and this letter. Any physical change in the process equipment or facility, or any change in the method of operation of the facility or its appurtenances which changes the amount of emissions from the equipment or facility from that described in your application and this letter, shall require a separate written Department applicability determination or plan approval, prior to the change.

Records shall be maintained in sufficient detail to document that the process equipment emission rates and facility wide emission rates are not exceeded. All records shall be totalized and maintained up-to-date such that year-to-date information is readily available for Department examination.

S. Russell Sylva
Commissioner
Gilbert T. Joly
Regional Environmental Engineer

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02347

947-1231, Ext. 680-684

COPY

December 20, 1986

Leach and Garner
Technology Division
Attleboro, Massachusetts 02703

ATTENTION: John H. Lovgren Jr.

RE: SMAPCD--NORTH ATTLEBOROUGH--
Section 7.02, Plan Approval,
Application No. SM-86-049-IF,
Refining Division, Miller Furnace
Baghouse, Source #0189

Gentlemen:

The Department of Environmental Quality Engineering, Division of Air Quality Control has reviewed your submittal dated April 8, 1986, and amended October 3, 1986, requesting approval to modify the Miller furnace's air pollution control equipment at your facility located at 255 John Dietsch Boulevard Extension, North Attleborough, Massachusetts. All information was submitted over the seal and signature of Kevin O'Neill P.E. 29054.

The application was submitted in accordance with Section 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control Regulations" adopted by the Department pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Sections 142A-E, 142J and Chapter 21C, Sections 4 and 6.

Review of the application discloses that the Miller furnace exhaust will be modified by the installation of a baghouse between the furnace and the existing scrubber. The process will remain as previously approved (SM-83-090-IF). The "Miller" reclamation furnace involves the melting of scrap metal in an electrically heated furnace, and the incorporation of Chlorine gas to formulate various precious metal salts. The process capacity is 15 pounds of metal per 8 hour shift.

Upon completion of the modification the exhaust from the Miller furnace will be controlled by an American Air Filter Model 4-168-400 baghouse. The baghouse will consist of four cartridges, 42 bags each, having a total collection surface area of 400 square feet. Air to cloth ratio will be 4 to 1. Overall collection efficiency is > 99.5%. The resulting chloride emissions will not exceed 0.02 pounds per hour. (.1 Tons per year).

The Department, as a result of its review, is of the opinion that the plans, specifications, Standard Operating and Maintenance Procedures relative to this application are in conformance with current air pollution control engineering practices and hereby approves the application provided that:

1. The Department shall be notified, in writing, when construction of the facility is complete and has been deemed ready for operation.

2. The equipment shall be operated and maintained in strict accordance with the approved "Procedures" and said "Procedures" shall be permanently posted on or near the respective equipment.

3. In the event that the operation of said equipment causes or contributes to a condition of air pollution, corrective action shall be immediately implemented.

4. The system shall be exhausted through the existing scrubber until such time as Leach and Garner submits to the Department for approval stack information and actual exhaust particulate concentration data to substantiate the submitted collection efficiency.

An Environmental Notification Form, for air quality control purposes, was not required for this action since it is categorically exempt pursuant to the Regulations Governing the Preparation of Environmental Impact Reports adopted by the Secretary of Environmental Affairs. This action has been determined to cause no significant damage to the environment.

This approval pertains only to the air pollution control aspects of the proposed and does not negate the responsibility of the owners or operators to comply with other applicable laws.

Very truly yours,

Christopher Tilden, P.E. Acting
Deputy Regional Environmental Engineer

T/VMS/Relm

cc: Board of Health
43 So. Washington Street
No. Attleborough, MA 02760

DEQE - DAQC
ATTN: Program Implementation Branch

S. Russell Sylva
Commissioner
Gilbert T. Joly
Regional Environmental Engineer

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Quality Engineering

Southeast Region

Lakeville Hospital, Lakeville, Massachusetts 02347

947-1231, Ext. 680-684

December 17, 1986

Leach & Garner Technology Division
49 Pearl Street
Attleboro, Massachusetts 02703

ATTENTION: Dr. Ravindra M. Nadkarni

RE: SMAPCD--NORTH ATTLEBOROUGH--Section 7.02, Plan Approval, Application No. SM-86-088-IF, Leach & Garner Refining Division, 255 John L. Dietsch Blvd., Source No. 0175

Gentlemen:

The Department of Environmental Quality Engineering, Division of Air Quality Control, has reviewed your application concerning the proposed installation of a precious metal reclamation process described as the "Wohwill" process at your facility located at 255 John L. Dietsch Boulevard, North Attleborough, Massachusetts. The application, originally dated June 10, 1986, has experienced several revisions, the most recent of which was received by the Department on November 28, 1986, has been submitted and attested to by J. Kevin O'Neil, P.E. 29054, in accordance with Section 7.02 Plan Approval and Emission Limitation as contained in 310 CMR 7.00 "Air Pollution Control Regulations" which were adopted by the Department pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Sections 142 A-E and 142J, as well as Chapter 21C, Sections 4 and 6.

The Department's review pertains only to the air pollution aspects of the proposal and does not negate the responsibility of the owners or operators to comply with all other applicable laws, regulations or permitting requirements.

Pertinent plans relative to this submittal are three in number and are delineated as follows:

Roof Plan titled "REFINERY: ROOF PENETRATIONS, STACKS" drawing number R-1003 dated 10/8/86

Building Side View titled "STACK ELEVATIONS." drawing number R-1004 dated 10/8/86

Hood Design titled "GOLD ROOM DUCTWORK," no number, not dated.

Review of the submitted information has revealed that the proposed precious metal reclamation "Wohwill" process will result in the generation of approximately 10 pounds per hour of hydrochloric acid mist. The HCl mist will be vented to the ambient atmosphere at a rate of 4500 acfm through a 12 inch diameter metal stack the top of which will be 45.3 feet above ground level after passing through an ACS Industries "Mistermesh Demister" rated as having a control efficiency in excess of 95%.

The Department as a result of its review is of the opinion that the subject application is in conformance with current air pollution control engineering practices and hereby approves the application subject to the following provisos:

1. The facility shall operate and maintain the equipment in accordance with the terms as described in the application.

2. The facility shall notify the Department in writing should it be necessary to modify or deviate from the approved Operating or Maintenance Procedures.

3. The facility shall immediately institute corrective measures should emissions cause or contribute to a condition of air pollution and shall immediately notify the Department by telephone and subsequently in writing of same.

An Environmental Notification Form for air quality control purposes was not required for this action since it is categorically exempt pursuant to the Regulations Governing the Preparation of Environmental Impact Reports adopted by the Secretary of Environmental Affairs. This action has therefore been determined to cause no significant damage to the environment.

Very truly yours,

Christopher Tilden, P.E., Acting
Deputy Regional Environmental Engineer

T/VMS/Jre

Enclosures

cc: Board of Health
North Attleborough, MA 02760

DAQC
ATTN: Program Implementation Branch

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Southeast Region
Lakeville Hospital, Lakeville, Massachusetts 02346
947-1231, Ext. 680-684

S. Russell Sylva
Commissioner
Paul T. Anderson
Regional Environmental Engineer

April 18, 1986

Leach and Garner Company
49 Pearl Street
Attleboro, Massachusetts 02703

ATTENTION: Kevin O'Neil

RE: SMAPCD--NORTH ATTLEBOROUGH--Section 7.02, Plan Approval, Application No. SM-84-069-IN, Leach and Garner Company, Refining Division, 255 John L. Dietsch Blvd.

Gentlemen:

The Department of Environmental Quality Engineering, Division of Air Quality Control has reviewed the plans, specifications, Standard Operating Procedures and Standard Maintenance Procedures concerning the installation of two (2) precious metal reclamation incinerators at your facility located at 255 John L. Dietsch Boulevard, North Attleborough, Massachusetts. The application originally submitted on April 3, 1984, as part of an overall facility construction permit which was initially approved by the Department on August 14, 1984 in Application Nos. SM-83-090-IF and SM-83-091-IF, has been repeatedly revised, amended and resubmitted due to evident inconsistencies between theoretical design parameters and actual operations. The current application as finally compiled and received by the Department on February 28, 1986, was submitted over the seal and signature of J. Kevin O'Neil P.E. 29054. In addition to data associated with the aforementioned "overall facility permit" plans and pertinent information relative to this application are designated as follows:

Incinerator Design Plan, "The United Corporation" dated 9-14-83

Incinerator Design Plan, "Consumat Systems, Inc." dated Jan. 26, 1981

Incineration Operations Overview, dated 2/28/86

A to Natural Gas ≈ early 1990's
Notification Made? 08/01/88

Review of the submitted information has revealed that a United Corporation G-466-pm and a Consumat Systems, Inc., C-120 precious metal reclamation incinerators will be installed and operated eight (8) hours per day, five (5) days per week, at the above referenced facility.

The United G-466 incinerator will be a batch fed unit equipped with a primary and a secondary chamber and will be capable of combusting 300 pounds per hour of Type 0 waste. The primary chamber will be equipped with two (2) Eclipse 236-JIB-C2 burners each rated at 750,000 Btu per hour. The secondary chamber will be equipped with one Eclipse 200-GP burner rated at 2,000,000 Btu per hour. All three burners will utilize propane as the fuel of use. Both chambers will be equipped with thermocouples which will monitor gas temperature such that the minimum temperature in the primary and secondary chambers will be maintained at 1200°F and 1600°F respectively at all times throughout the burn cycle.

The products of combustion (gases and particulates) will be exhausted to the ambient atmosphere through an 18 inch diameter, refractory lined, metal smokestack the top of which will be approximately 30 feet above ground level.

The Consumat C-120 incinerator will also be a batch fed unit equipped with a primary and a secondary chamber and will be capable of burning 435 pounds per hour of Type 0 waste. The primary chamber will be equipped with one Eclipse WC-3 burner rated at 125,000 Btu per hour. The secondary chamber will be equipped with one Eclipse WC-6 burner rated at 700,000 Btu per hour. Both burners will utilize propane as the fuel of use. Thermocouples will monitor gas temperatures such that the minimum temperatures in the primary and secondary chambers will be maintained at 1200°F and 1600°F at all times throughout the burn cycle. The products of combustion (gases and particulates) will be exhausted to the ambient atmosphere through a 26 inch diameter, refractory lined, metal smokestack, the top of which will be approximately 33 feet above ground level.

The allowable particulate emission rate, as contained in 310 CMR 7.02(11) for each incinerator is 0.10 grains per dry standard cubic foot of flue gas, corrected to 12% CO_2.

The Department as a result of its review is of the opinion that the submittal is in conformance with acceptable air pollution control engineering practices and hereby approves the application subject to the following provisos:

1. Each unit shall be operated in strict accordance with respective Standard Operating and Maintenance Procedures which shall be posted on or near each incinerator. Any change in said procedures must gain prior Department approval.

2. A tracking log shall be implemented for each incinerator reflective of operating hours, charging data, operating temperatures and general operations and maintenance. Said log shall be made available to the Department for review upon request.

3. Corrective action shall be immediately implemented should emissions or equipment malfunction be found to cause or contribute to a condition of air pollution.

4. Plans shall be considered relative to the installation of suitable air pollution control equipment should it be deemed necessary by the Department.

5. Provisions shall be made for the equipment to accomodate stack emissions testing should it be deemed necessary by the Department.

An Environmental Notification Form, for air quality control purposes, was not required for this action since it is categorically exempt pursuant to the Regulations Governing the Preparation of Environmental Impact Reports adopted by the Secretary of Environmental Affairs. This action has been determined to cause no significant damage to the environment.

This approval pertains only to the air pollution aspects of the proposal and does not negate the responsibility of the owners or operators to comply with other applicable laws and regulations.

Very truly yours,

Paul T. Anderson, P.E.
Regional Environmental Engineer

A/VMS/Jlm

Enclosures

cc: Board of Health
43 So. Washington Street
No. Attleborough, MA 02760

No. Attleborough Fire Department
No. Attleborough, MA 02760

DAQC - Program Implementation Branch

ENGINEERING REPORT

General Description of the Facility

Metalor USA Refining Corporation employs 140 people at this facility to produce pure gold, pure silver and silver salts, pure copper, and impure forms of these and other non-ferrous metals. Primary raw materials include: bullion from trading companies and banks, secondary precious metal scrap and byproducts from the jewelry and electronics industry, and primary gold and silver bars from the mining industry. Product is shipped in the form of pure bars and grain, powder, sponge, silver cyanide salts, dry powder ("prepared sweeps"), and filter cake.

The plant runs 24 hours per day, 7 days per week. Shifts change at 07:00, 15:30, and 23:00. Operations diminish somewhat during the weekend, with the plant often running unattended on Sundays. Operations also diminish on holidays and during physical inventory. Physical inventory is generally taken twice a year, typically around the 4th of July and between Christmas and New Years Day, requiring roughly 2 weeks each time.

Various chemical products are consumed by Metalor's North Attleboro refinery. They include: anhydrous ammonia, carbon dioxide, chlorine, hydrochloric acid, sulfuric acid, nitric acid, sodium hydroxide, sodium sulfite, sodium hypochlorite, sodium chlorate, potassium cyanide, dextrose, and various commercial formulations for the treatment of cooling towers and a boiler. The first two industrial gases and sodium hypchlorite are being phased out of use by Metalor. Cyanide is used in stoichiometric amounts to make silver salts, and cyanide leaves the plant only in product form. All other chemicals report in some form to the industrial wastewater pretreatment system. Dextrose is oxidized to lighter, water soluble hydrocarbons. Chlorine is converted to dissolved sodium chloride.

Rated and Actual Production Levels

Production capacity of the manufacturing operation varies depending on product mix. Assuming that the mix remains the same as in 1993-94, then production rates can be represented by the following data. All data are in troy ounces (TO) per week:

Production Unit	Production Capacity	Actual Production Rate
Gold Refining	105,000	53,000
Silver Refining	154,000	125,000
Other non-ferrous metals	250,000	80,000

Description of Principle Wet Processes

Hydromet

When first established in the mid-80's, the refinery relied on a unique hydrometallurgical technology for the initial separation of precious metals from other non-ferrous metals. Using ammonia and carbon dioxide to control the chemistry of a leach solution, the system was safer and less polluting than the acid leaching systems employed by other refiners. The ammonia solution selectively dissolved copper, zinc, and other non-ferrous metals from the feedstocks. It left behind a residue of concentrated precious metals that could be economically refined by other processes. Base metals were collected as hydroxide salts and sold as feedstock to copper smelters.

Ammonia was intensively recycled within the process. Nonetheless, trace quantities did escape to wastewater via batch discharge to other water-using processes. In late 1992 the refinery installed an ammonia destruction process to deal with those trace quantities.

Currently this entire system is being phased out by Metalor. No more anhydrous ammonia or carbon dioxide is being purchased, and the equipment is scheduled for removal sometime in 1996.

Sulfate

The Sulfate system has largely taken the place of the old Hydromet system. It uses sulfuric acid as the leaching solution, and it employs electrowinning cells to recover pure metallic copper from solution. Most of the copper entering the system is recovered as metallic copper, and sulfuric acid is intensively recycled at the same time. Other soluble base metals are periodically bled to residual recovery in a strongly acidic solution.

Miller

The Miller process is the most popular process world-wide for the refining of karat gold alloys and certain grades of primary gold. It is equally effective on the residues of the Hydromet and Sulfate systems. The process begins with the melting of metallic feedstocks in specially designed electric induction furnaces. Into the molten metal the process operators inject chlorine gas. The chlorine reacts selectively with base metals and silver, forming a low density chloride salt that floats on top of the remaining gold and platinum group metals (PGMs). Some of the metal chlorides are so volatile that a portion boils off from the furnace as a fume; these volatile salts, together with traces of chlorine gas, are captured in a wet electrostatic precipitator (ESP).

The wet ESP, despite internally recycling most scrubbing liquor, continuously uses and discharges water. Much of the water for the ESP actually comes from other production units. All of the water from the ESP goes through precious metal recovery filters and other residual recovery units on its way to the wastewater treatment system.

Gold Cells

The Miller product, typically assaying 97% pure gold, is not good enough to be sold directly.. Further refinement to 99.99% pure gold is the work of the electrolytic gold cells. Here, in a solution of hydrochloric acid and soluble gold chloride, the impure gold (anodes) dissolve and pure gold is recovered as a cathodic deposit. After careful washing with water and other solutions, the pure gold is ready to be melted into its final product form

The acidic electrolyte and rinse solutions from the gold cells are batch discharged through residual recovery units before reaching the wastewater treatment system.

Silver Cells

As for gold, electrolytic cells are the final step in the production of 99.99% pure silver. The impure silver anodes dissolve in a solution of nitric acid and soluble silver nitrate, and pure silver is recovered as a cathodic deposit. After removal of silver, the solution is batch discharged through residual recovery units before reaching the wastewater treatment system.

Residual (Byproduct) Recovery

All of the processes above reject other metals, either in an aqueous solution or as a slurry. Almost all acidic processes discharge water to a large tank -- T301 -- either directly or indirectly. Variations in composition are equalized by bottom-to-top circulation within T301, and some portion of the acidic solution is recycled through an adjacent residual recovery reactor. Most of the acidic solution is pumped directly through filters and strong anion exchange columns to recover silver and traces of other precious metals. Solids trapped by the filters are returned to upstream processes for recovery of precious metal value.

Acidic, precious-metal-free solutions are treated in a tank T902. There, under agitation, the solutions are generally adjusted by automatic addition of caustic soda to pH 10. With increasing pH, base metals precipitate as insoluble hydroxides. These base metal compounds are recovered as a moist cake using a large filter press. The filter cake [mostly $Cu(OH)_2$ with traces of precious metals] is shipped to copper smelters. The filtrate is accumulated in the wastewater pit.

Solid silver chloride is produced by several of the processes above. This byproduct is converted on-site to metallic silver for subsequent refining by the silver cells. The effluent from this conversion process is an alkaline solution with substantial BOD and relatively low concentrations of heavy metals, primarily copper. Tank T902 and the large filter press are used to treat the alkaline solution from silver chloride conversion. The wastewater operators have learned that combining this stream with the acidic stream from T301 will generally yield a solution with persistently high copper concentrations. Best results are obtained when the alkaline solution is treated as a separate batch, and is neutralized by the acidic bleed from the sulfate system. By this technique several goals are achieved simultaneously. Most of the copper from the sulfate system bleed is precipitated, the use of purchased acids is minimized, and a filtrate is obtained that is reasonably low in copper. This filtrate drains to the wastewater pit.

The residue of these recovery operations is an alkaline filtrate containing relatively low levels of copper and other heavy metals. This filtrate drains to the wastewater pit.

Silver Cyanide

Silver nitrate, sodium cyanide, and potassium cyanide are combined stoichiometrically to make pure silver cyanide salts. Standard operating practices ensure that both cyanide and silver are reduced to very low concentrations by the time all product is filtered from the system and filtrate must be discharged to the wastewater system. Nonetheless, each batch of filtrate from

cyanide manufacture is carefully analyzed prior to discharge to the wastewater pit. Any solution found to contain measurable quantities of silver or cyanide is reworked and retested before being discharged.

Incineration

Metalor operates three incinerators at the North Attleboro refinery which prepare materials for sampling or further processing. One of these, the Atlas incinerator, is equipped with a wet scrubber for the control of acid gas and particulate emissions. A quench spray, supplied with city water, cools the incinerator exhaust from over 1600 °F to under 200 °F before it enters the scrubber. Caustic soda is added at the scrubber to control pH. The alkaline scrubbing solution and quench water drain to the wastewater pit.

Assay Laboratory

The assay laboratory uses nitric acid to part silver and gold. The resulting silver nitrate solution is carried by hand to the silver cells for recovery of silver.

Aqua regia is used in the lab to a more limited extent for dissolution of gold and PGM samples. The resulting chloride solution is carried by hand to the gold cells for recovery of gold and platinum group metals.

Technology Lab

New processes are tested and developed in the Technology Lab. Specialized assays are also conducted there, often using plasma emission spectroscopy to analyze solutions made by acid digestion. Dilute wastewater from these operations drains into the refinery wastewater treatment system. Concentrated wastes are transported to the appropriate manufacturing process for recovery of precious metal value.

Wastewater treatment

A multi-stage industrial wastewater pretreatment system accepts aqueous discharges from all of the processes mentions above. By methods described in detail on page 8, heavy metals are removed and pH is adjusted to meet pretreatment quality requirements. All wastewater after control is discharged to the municipal sewer and, thus, to the publicly owned wastewater treatment plant (POTW) operated by the town of North Attleborough. There is no discharge to navigable waters or to groundwater.

Sources of Water Supply

The sole source of water to Metalor is the North Attleboro municipal water system.

Consumption is typically equal to 449,774 gallons per month..

A typical analysis of the town water is reported in Table 1.

Disposition of Water and Characterization of Wastewater Sources

Figure 1 summarizes the fate of water at Metalor.

The sanitary wastes from bathrooms, water fountains, etc., should be free of inorganic contaminants other than those entering with the city water. They can be highly loaded with organic matter. They are not hazardous wastes from a regulatory standpoint, and they are not suitable for treatment by Metalor's wastewater system. They are discharged directly to the sewer.

City water is used for once-through non-contact cooling of certain laboratory instruments. This non-contact cooling water should have exactly the same composition exiting and entering the building. It is re-used as make-up water for evaporative cooling towers.

A boiler is used to heat most of the plant in cold weather. The Hydromet system consumed a lot of steam by direct injection. With the phase-out of Hydromet, almost all condensate returns to the boiler and boiler blowdown is negligible.

In contrast, much more water is blown down from the refinery's two evaporative cooling towers. This water has been treated with various chemicals to control biological growth, to avoid fouling or plugging of the cooling water system, and to retard corrosion. The chemicals are described by MSDS sheets attached as Appendix A. The blowdown meets the town pretreatment requirements without treatment. The smaller tower is blown down directly to sewer. The larger tower discharges to the wastewater pit.

The refinery floors are washed routinely in order to recover precious metals. Floor wash water is re-used as make-up water for the ESP.

The fate of other streams has been described briefly above and is discussed in more detail below. Figure 2 summarizes the salient characteristics of each process discharge.

Residual (Byproduct) Recovery System

As described on page 4, base metals that are separated from precious metals by other processes are recovered by the residual recovery system. These residual base metals are captured in a matrix consisting primarily of zinc and copper hydroxides. They salts are currently sold to copper smelters located in the U.S., Europe, and Japan.

Wastewater treatment studies

Since the original design of the wastewater treatment system in 1983, the system has been the subject of repeated study by the refinery's R&D (Technology) group, by production management, by the wastewater treatment plant operators, and by outside consultants. Studies have been concentrated on five parameters: copper and precious metals, ammonia, sulfate, and mercury.

Most studies by Technology and by production management have been motivated by the concept of controlling problems at the source. For example, the presence of ammonia is known to complicate the control of copper concentrations. Thus, early studies focused on improving control of the hydromet process in order to minimize aqueous ammonia loss. The refinery learned to recycle ammonium sulfate from the hydromet vent scrubber, rather than dispose of it through the waste treatment system. Reliable process endpoint detection was found to help minimize the concentration of ammonia in filtrate from the hydromet process. Finally, extensive development and engineering effort led to the replacement of the hydromet process by a sulfuric

acid leaching process. As a result, ammonia is no longer being purchased by the refinery and effluent ammonia concentration often meets the local pretreatment limit.

More recent studies have focused on optimizing reagent additions and other reaction conditions in the conversion of silver chloride to silver. Good process control has been found to minimize the formation of organic chelating compounds which otherwise cause problems in the wastewater treatment system..

Some studies have focused on destroying complexing compounds that escape from various processes. In the early 80's, for example, the present Director of Manufacturing tested methods for the destruction of ammonia. Alkaline chlorination was found to work, and this technology was implemented at full scale in time to respond to tightening of the local pretreatment limits.

Still other studies have focused on new methods of recovering of heavy metals from solution. New ion exchange resins have been tested and put into service. Sulfide precipitation has also been studied and was tested in a portion of the plant within the past year; it might be of benefit in meeting the local pretreatment limit for mercury, but more testing is required.

Some effort has been expended in studying the feasibility and necessity of compliance with the local pretreatment regulations. In early 1992 the town put in place more stringent pretreatment regulations. Metalor was surprised to find that a low limit was suddenly placed on effluent sulfate concentration. Under the terms of an Administrative Order, a consultant was hired to evaluate the possibility of reducing sulfate discharges; he found no good methods for doing so. [The conclusions of this study are presented in their entirety in Appendix E of this application.] Sulfate was found not to be a problem in the discharge of the POTW, nor was it found to be adversely affecting the operation of the POTW. The only justification for sulfate control was the concern by the town's consultant that it might corrode concrete sewer pipes between Metalor and the POTW. The pipe and an intermediate pump station were, therefore, inspected by a third consultant at Metalor's expense; the structures were found to be substantially free of any sign of sulfate corrosion. Inspection revealed no corrosion of the pipe crown such as occurs in classic sulfate corrosion of sewers. Slight corrosion of the submerged wall of the pumping station was seen, particularly in a region which had accumulated a large quantity of floating solids, but penetration was less than 1/8" and no spalling was found. Residue from the corroded regions were not enriched in sulfate. Metalor and its consultants have concluded that its discharge of sulfate is not a threat to the POTW or the sewer system or the environment. For this reason Metalor has formally asked the town to drop its requirement for continued sulfate monitoring. [See Appendix F.] The sulfate pretreatment limit itself will be reviewed by the town and its pretreatment consultant in 1995.

DeFeo, Wait, and Pare, Inc. studied the possibility of Metalor's compliance with the local pretreatment limit for ammonia or, alternatively, the appropriateness of developing a site-specific ammonia discharge standard. They concluded that a variance should be sought, limiting Metalor's ammonia discharge to a maximum of 100 ppm. The conclusions are presented verbatim in Appendix G.

4B04042

Metalor Technologies USA
Refining Division

METALOR®

December 22, 2004

Mr. Thomas Cushing
Massachusetts Department of Environmental Protection
Southeast Regional Office
20 Riverside Drive
Lakeville, MA 02347

Re: Facility ID 130075
Transmittal No.: W 053241

Dear Mr. Cushing

We wish to install a dissolution process and scrubber system at the Metalor Technologies USA facility located at 255 John Dietsch Boulevard, North Attleboro, Massachusetts.

Please find the enclosed completed permit applications BWPAQ01-B, and BWPAQSF-3 submitted for your consideration and approval. A payment of $525 was submitted to the MADEP Boston office under transmittal number W053241 and check number 106965 as required for the Limited Plan Approval fee (see enclosed transmittal form and check photocopy).

Should you have any questions or comment[illegible]bmittal I may be reached at 508-699-8800 ext 2[illegible] you may contact Dr. David Kinneberg at 508-69[illegible]

f 695 FFBD
re George 224
MGC
f-226-4490

Sincerely,

Charles S. Tatakis
EH & S Coordinator
Metalor Technologies USA

Cc: Kinneberg, D.

255 John Dietsch Boulevard
North Attleboro, Massachusetts 02761-0255

Tel: 508-699-8800
Fax:508-695-1603

www.metalor.com
info@metalor.com

SWRT-03
4P04042

Massachusetts Department of Environmental Protection
Bureau of Waste Prevention – Air Quality

BWP AQ 01-B

Limited Plan Approval • Application for Non-Fuel Emissions

W053241
Transmittal Number

Date Received

A. Description of Project

1. Metalor Technologies USA — Facility Name
   255 John Dietsch Boulevard, No Attleboro, MA — Location

2. General description of construction, substantial reconstruction, or alteration and exact location within the facility.

   Installation of three reactor vessels; Two 350 gallon leaching vessels utilizing hydrochloric acid and chlorine gas. Two 400 gallon precipitation vessel utilizing sulfur dioxide gas as a precipitating reagent. (See Process Description on pages 14 -16)

   Reactor Vessels – Tricor Industrial and NEPCP — Manufacturer of affected process equipment*
   Custom Designed — Model number*
   May 14, 2005 — Estimated Installation Date
   500 troy ounces of gold precipitate per hour — Normal Hourly Production Rate (as % Maximum Hourly Production Rate)

   8760 hours per year — Estimated Maximum Operating Schedule
   24 hours — Hour/Day
   7 days per week — Days/Week
   52 Weeks/Year — Weeks/Year

3. Is the proposed project modifying previously approved equipment? ☐ Yes X No

   If "Yes", list the previously issued air quality approval(s) for this equipment.

Application Number	Approval Date

B. Air Pollution Control Equipment

Packed Bed Scrubber — Type of Air Pollution Control Equipment
Trimer — Make*
VF-72-96 — Model Number*
Caustic packed bed scrubber to remove Cl2, HCl, and SO2 from air stream. The FRP scrubber column is designed to pass 8,000 ACFM. — Brief Description

* If not determined at time of application, indicate probable unit "or equliviant". Specific make and model must be provided prior to final approval.

Standard
4P04042

Massachusetts Department of Environmental Protection
Bureau of Waste Prevention – Air Quality

BWP AQ 01-B

Limited Plan Approval • Application for Non-Fuel Emissions

W053241
Transmittal Number

Date Received

A. Description of Project

1. Metalor Technologies USA
Facility Name

255 John Dietsch Boulevard, No Attleboro, MA
Location

2. General description of construction, substantial reconstruction, or alteration and exact location within the facility.

Installation of three reactor vessels; Two 350 gallon leaching vessels utilizing hydrochloric acid and chlorine gas. Two 400 gallon precipitation vessel utilizing sulfur dioxide gas as a precipitating reagent. (See Process Description on pages 14 -16)

Reactor Vessels - Tricor Industrial and NEPCP
Manufacturer of affected process equipment*

Custom Designed
Model number*

May 14, 2005
Estimated Installation Date

500 troy ounces of gold precipitate per hour
Normal Hourly Production Rate (as % Maximum Hourly Production Rate)

8760 hours per year
Estimated Maximum Operating Schedule

24 hours
Hour/Day

7 days per week
Days/Week

52 Weeks/Year
Weeks/Year

3. Is the proposed project modifying previously approved equipment? ☐ Yes X No

If "Yes", list the previously issued air quality approval(s) for this equipment.

Application Number	Approval Date

B. Air Pollution Control Equipment

Packed Bed Scrubber
Type of Air Pollution Control Equipment

Trimer
Make*

VF-72-96
Model Number*

Caustic packed bed scrubber to remove Cl2, HCl, and SO2 from air stream. The FRP scrubber column is designed to pass 8,000 ACFM
Brief Description

* If undetermined at time of application, indicate probable unit "or equiviant". Specific make and model must be provided prior to final approval.

Process Description

The proposed process will be, as far as possible, a clone of the system installed at the Metalor facility in Marin, Switzerland.

Process Overview

Impure metal, containing less than 15% silver, is atomized to produce fine particles that are amenable to leaching. The atomized material is dissolved in hydrochloric acid using chlorine gas as the oxidant. In excess of 99% of incoming gold dissolves into solution along with PGM's and base metals. Silver in the feed dissolves and re-precipitates as silver chloride, which is removed from the gold-laden solution by filtration. Dissolved gold is reduced from solution with sulfur dioxide gas. After filtering and rinsing, the gold is melted. Solution from the precipitation contains platinum group metals, which are collected for subsequent processing.

There is synergy between the Hydrometallurgical Refining Process (HRP) and Miller/Wohlwill. The dissolved gold in spent solution from the Wohlwill cells can be precipitated in the reduction stage of the HRP while fresh solution (known as point solution) can be manufactured in the leaching stage. The presence of an HRP, with its daily routine of dissolution/precipitation, speeds up the residence time for the Miller/Wohlwill because byproduct streams are processed more efficiently.

In preparation for dissolution, feed is melted and poured through a high-pressure stream of water where it is atomized to produce a fine powder. The finer the powder, the more surface area and the faster the dissolution reaction.

Metal Dissolution

Wet atomized feed is mixed in dilute hydrochloric acid. Chlorine gas is then injected into the slurry to oxidize and dissolve gold and most other metals. Heat generated by the exothermic reaction is not sufficient to maintain the optimum reaction temperature of between 80 and 90^{0}C. A closed loop recirculation heating system will be used to maintain temperature during reaction (and preheat the solution to initiate the reaction). The reactors, arranged in parallel, will be vigorously agitated to fluidize all solids during leaching. This is particularly important when high-silver feeds are being leached as silver chloride on the surface of the particles inhibits the rate of reaction; vigorous agitation is necessary to prevent the build up of silver chloride on particle surfaces. Although this

proposal is based on using two glass-lined reactors similar to those in Marin, the suitability of less-expensive titanium reactors is being investigated.

Most of the chlorine gas injected into the reactor is dissolved in the HCl solution where it reacts with the metal. Residual chlorine creates an overpressure, which is maintained at around 1 bar by adjusting the flow rate of chlorine into the reactor. The chlorine demand, determined by the rate of reaction, drops to zero when all metal has been dissolved or further reaction is inhibited by silver chloride. This drop in demand is used to determine reaction end point. When leaching is complete, air is bubbled through the solution to displace any dissolved yet un-reacted chlorine gas before filtration. The slurry is then cooled to below 30^0C by flowing chilled glycol solution through the reactor jacket. Cooling the solution lowers the solubility of silver chloride, which aids in preventing post filtration precipitation of silver chloride during the gold reduction stage.

The cooled slurry is then filtered to remove undissolved metal and silver chloride. Filtrate is pumped to a reduction tank. Solid residue is washed and sent to the silver refining circuit.

Gold Reduction

Originally, it was thought that two stages of reduction would be required to reliably produced 99.99% pure gold. However, day-to-day operations in Marin have demonstrated that a single reduction step is sufficient. Nevertheless, equipment will be designed so that a two-stage reduction could be performed in the US if needed. Depending on the level of impurities, between 90 and 98% of the gold can be recovered in the first stage as 99.99% (4 9's) pure gold. The balance would then be precipitated in the second stage as an impure product that is recycled to the dissolution reactors. The reason for not recovering all the gold on one reduction stage is that overdosing of SO_2 during reduction can lead to the production of impure product. Stopping the reaction short of the end point ~~ensures~~ reduces the risk of making impure product.

The flow rate of the SO_2 will be optimized to ensure production of pure product in the shortest possible time. The end point of the reduction in both stages will be determined by monitoring solution ORP. The first stage reduction will end when the ORP drops below 700 mV at which point about 1-5 gpl of gold will still be in solution to be recovered in the second stage.

Well-agitated fiberglass reinforced Kynar vessels fitted with a bottom discharge valve will used for reduction. Good agitation will be provided to ensure complete dispersion of the freshly precipitated gold. This is

necessary to prevent the occlusion of solution in the precipitated gold mud, which can affect the final purity.

The gold produced will be filtered using a Buchner filter where it will be washed in a highly agitated dilute HCl solution using a mobile station. The gold will then be thoroughly rinsed with DI water to displace any entrained solution. The wash water containing some un-dissolved gold will be returned to the reactor.

Plant Description

The dissolution, reduction and PGM recovery portions of the HRP will be located on the main mezzanine in the middle of the facility. Use will be made of height difference between two sections of mezzanine to accommodate the bottom discharge of the reduction tanks without having to elevate the tanks more than necessary. Filtration equipment to recover reduced gold mud will be placed on the lower mezzanine. A small scissor type elevator will be used to move material from one level to the other. The height of the curb around the mezzanine will be extended to create a fully contained area to cope with any unexpected spillage of solution. The floor of the mezzanine will also be recoated with an epoxy to provide a chemically tight layer.

A collection tank for gold free solution and a tank for PGM free solution will be located on the ground floor directly below the main HRP area. Existing fiberglass tanks from the sulfate process that are already in position will be used for this purpose.

To minimize corrosion and provide a healthy working atmosphere, the HRP scrubber system is designed to change the air in the process area 6 times per hour. A fiberglass dropped ceiling will be installed to minimize the volume of the room hence the scrubber size. The ceiling will also assist in keeping the area cooler in the summer. The packed bed gas scrubber will be located on the ground floor inside the building and adjacent to the collection tanks or outdoors at the back of the building. If located indoors, the blower will be located on the roof directly above the scrubber body

The atomization furnace and associated equipment will be placed on the mezzanine above the melt shop with the atomization collection tank located on the ground floor below. This location provides easy access to electrical power, cooling water and the melt shop bag house. Once atomized, the metal will be transported from the ground floor upstairs by means of an existing vertical conveyor. This material will ultimately be charged to the dissolution reactors.

BACT Analysis for a chlorine / sulfur dioxide scrubber in a precious metal refinery at Metalor Technologies, Inc.

A. Introduction

This analysis follows, where applicable, the NESCAUM BACT Guideline of June 1991.

Chlorine is widely used in the precious metal industry both because it is a strong oxidant and because it complexes precious and base metals forming stable chlorides or chloro-complexes in solution. Chlorine is used both in high temperature chlorination (Miller process) and in aqueous chlorination in hydrochloric acid solutions. In the first case, impurities in molten gold alloy are converted to volatile chlorides leaving behind liquid gold and other platinum-group metals. In aqueous chlorination, the application discussed here, solid particles of precious metal alloy are dissolved in HCl solutions using chlorine gas as the oxidizing agent. In either case, the tail gases from the process are scrubbed using an alkaline solution and the use of such alkaline scrubbers is universal for this application.

In considering whether any alternate technology is available outside the precious metal industry which might be considered in this BACT analysis, one can review the chlor-alkali industry's processes. In these processes, sodium chloride brines are electrolyzed in a diaphragm cell using metal (dimensionally stable anodes or DSA) or carbon anodes. The mercury cells used in the past are technically obsolete and have limitations imposed by NESHAP for controlling mercury emissions. The chlorine liberated at the anode is collected, scrubbed with water to remove entrained electrolyte droplets (sodium chloride), dehumidified and compressed to liquify chlorine for sale. The exit gases from compression/liquefaction still contain substantial amounts of chlorine. These are scrubbed with carbon tetrachloride to capture additional chlorine for sale and the tail gases from this process are scrubbed with caustic to reduce/eliminate emissions of residual chlorine, although some older plants did vent these emissions directly to the atmosphere.

As shown in the attached process description, gold-rich scrap with other precious metals and base metal impurities is dissolved in a closed, pressurized batch reactor in a solution of hydrochloric acid with chlorine as an oxidizing agent. During the reaction, there are no emissions since the reactor is closed. After the dissolution is complete and chlorine consumption droops to zero, the reactor is opened and vented to a packed scrubber which operates with a sodium hydroxide solution as the scrubbing liquid. The scrubber therefore operates in a batch mode and treats only the gas that is present in the freeboard portion of the reactor or dissolved in the solution. During this portion of the operation, the cell is sparged with air to remove any residual chlorine.

The scrubbing reaction is:

$$NaOH + Cl_2 = NaOCl + HCl$$

$$HCl + NaOH = NaCl + H_2O$$

In a separate step, the scrubber will also be used when solutions containing gold chloride are reduced to precipitate metallic gold with sulfur dioxide.

The precipitation reaction is:

$$2Au\ Cl_3 + 3SO_2 + 6H_2O = 2Au^o + 3H_2SO_4 + 6HCl$$

The scrubber reaction is:

$$SO_2 + 2NaOH = Na_2SO_3 + H_2O$$

B. Identification of Control Alternatives

As noted in the Introduction, there is no alternative control technology in use in either the precious metal industry or even the chlor-alkali industry for this application. The carbon tetrachloride scrub is used on a much stronger, continuous stream of chlorine to recover chlorine for sale. In this case, the scrubber operates in a batch mode and is treating only the gas in the freeboard of the reactor when the dissolution operation is complete.

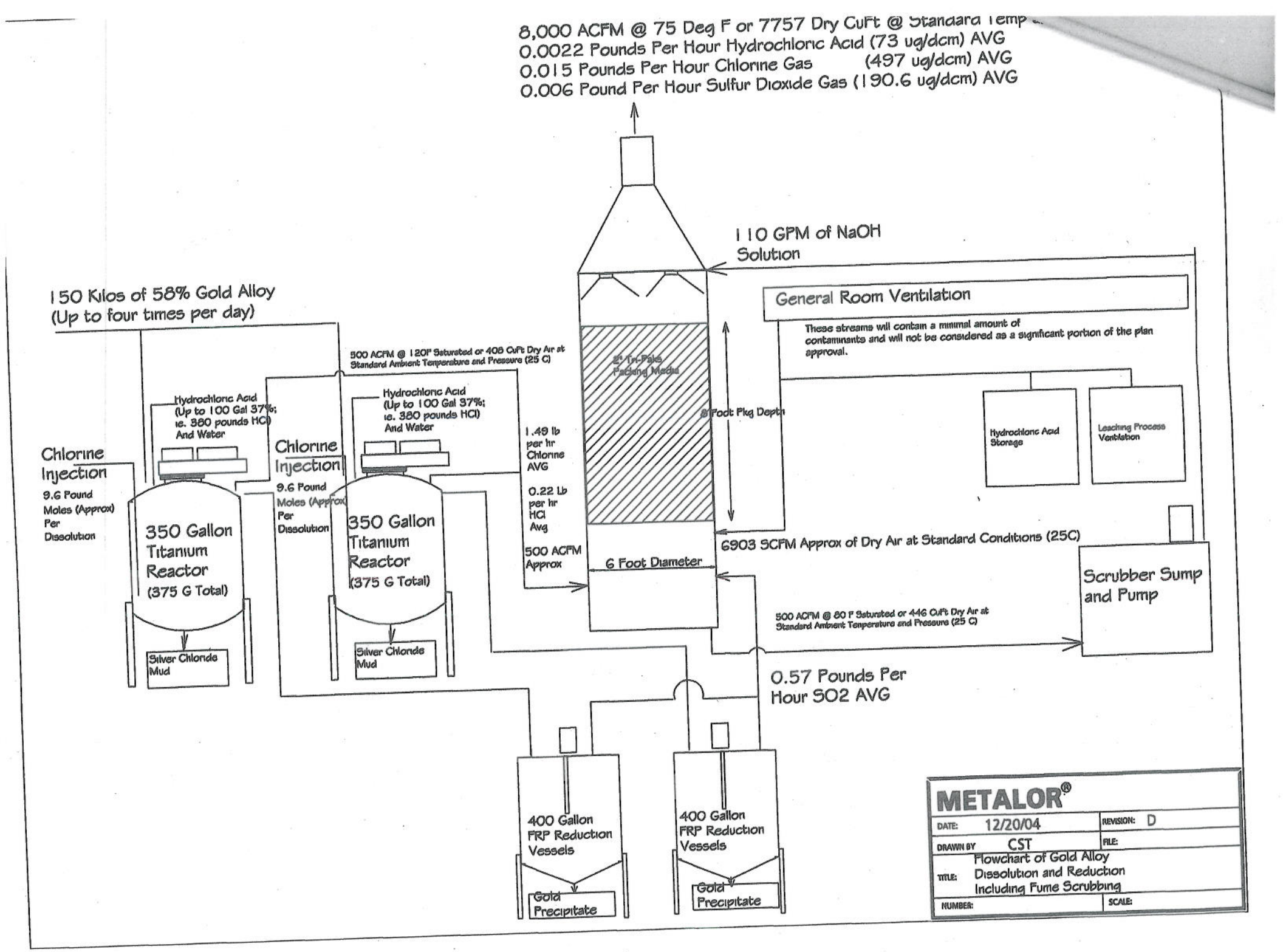
C. Evaluation of Selected Control Alternative

1. Chlorine scrubbing: The selected process parameters will enable the scrubber to operate at 99% efficiency. This results in emissions of 130 lb. per year or 0.07 tons per year of chlorine in the scrubber discharge. This compares favorable with allowable emissions of 0.39 tons per year for BACT/PSD requirements for Formosa Plastic Products as mentioned in EPA's Ract/Bact/Laer Clearinghouse.

The World Bank has published "Pollution prevention and Abatement Handbook- July 1998". This recommends that workplace exposures in the chlor-alkali industry be limited to below 3mg/Nm^3. The post-scrubber concentration before stack dilution and dispersion is well below this guideline and is at one-sixth this level. Therefore, the scrubber achieves a more than adequate degree of emission control.

2. Sulfur Dioxide scrubbing: The process parameters for this application also result in an efficiency of 99%. The annual emissions will be 50 lb/year. There is voluminous data for Sulfur dioxide emissions in EPA's Ract/Bact/Laer Clearinghouse for various industries. These emissions are lower than emissions allowed under BACT/PSD.

In terms of energy and economic impact, since this is a straight forward application of scrubbing technology, one can conceive of increasing scrubber efficiency to improve capture efficiency but only at the cost of increasing energy consumption with only a marginal improvement, if any, in environmental impacts. With the current emissions already better than those shown in the RBLClearinghouse, the additional cost of improving scrubber efficiency is not justified.


8,000 ACFM @ 75 Deg F or 7757 Dry CuFt @ Standard Temp
0.0022 Pounds Per Hour Hydrochloric Acid (73 ug/dcm) AVG
0.015 Pounds Per Hour Chlorine Gas (497 ug/dcm) AVG
0.006 Pound Per Hour Sulfur Dioxide Gas (190.6 ug/dcm) AVG
110 GPM of NaOH Solution
150 Kilos of 58% Gold Alloy (Up to four times per day)
General Room Ventilation
These streams will contain a minimal amount of contaminants and will not be considered as a significant portion of the plan approval.
500 ACFM @ 120F Saturated or 408 CuFt Dry Air at Standard Ambient Temperature and Pressure (25 C)
2" Tri-Pak Packing Media
8 Foot Pkg Depth
Hydrochloric Acid (Up to 100 Gal 37%; ie. 380 pounds HCl) And Water
Hydrochloric Acid (Up to 100 Gal 37%; ie. 380 pounds HCl) And Water
Hydrochloric Acid Storage
Leaching Process Ventilation
Chlorine Injection
9.6 Pound Moles (Approx) Per Dissolution
Chlorine Injection
9.6 Pound Moles (Approx) Per Dissolution
1.49 lb per hr Chlorine AVG
0.22 Lb per hr HCl Avg
500 ACFM Approx
6903 SCFM Approx of Dry Air at Standard Conditions (25C)
6 Foot Diameter
350 Gallon Titanium Reactor (375 G Total)
350 Gallon Titanium Reactor (375 G Total)
Silver Chloride Mud
Silver Chloride Mud
Scrubber Sump and Pump
500 ACFM @ 80 F Saturated or 446 CuFt Dry Air at Standard Ambient Temperature and Pressure (25 C)
0.57 Pounds Per Hour SO2 AVG
400 Gallon FRP Reduction Vessels
400 Gallon FRP Reduction Vessels
Gold Precipitate
Gold Precipitate
METALOR®
DATE: 12/20/04
REVISION: D
DRAWN BY CST
FILE:
TITLE: Flowchart of Gold Alloy Dissolution and Reduction Including Fume Scrubbing
NUMBER:
SCALE:

Calculation of Gas Emission to and from TriMer Scrubber

Basis
375.0 Gallon Maximum Reactor Volume
200.0 Gallon Typical Reactor Charge
80.0 Degree C Operating Temperature
Partial Pressure of HCL over HCL Solution 15%, 80 Deg C = 4.1 mm hg Perry
Partial Pressure of H2O over HCL Solution 15%, 80 Deg C = 254 mm hg Perry
Partial Pressure of Cl2 @ 80 Deg C = 700 MM Hg @ 3.0 GPL 700 mm hg Metalor
Reactor Pressure is 250 Mbar or 950 MMHg Total
Dissolve 150 kilos of 58% gold into 200 gallons of HCl/Cl2 Solution, 4 events per day, 240 days (But, maximums are extended to 365 day year)
The emission to the scrubber is a maximum when the reactor is purged and the gasses above the solution are exhausted when air is sparged into the reactor content to remove dissolved chlorine gas
The emissions from the scrubber are represented both a maximum as defined in the aforementioned basis and as an average where the total annual emissions from four dissolutions per day are divided by 365 days 24 hours.
The following reactions defscribe the dissolution of atomized gold alloys
Cu + Cl2 => CuCl2 Therefore 2 Lb mole Cl to each lb mole Cu
2Au + 3Cl2=> 2AuCl3 Therefore 3 Lb mole Cl to each lb mole Au
Sulfur Dioxide utilization is 95% of ideal, 5% is effluent to the scrubber system

A Calculation of Total Chlorine Consumed to Dissolve Gold and Copper Alloy

Assume Gold plus Copper Alloy (Worse Case Scenario Regarding Chlorine Consumption)

150	Kilograms	X	42.00%	=	63 Kilo Cu	2.12 Lb Mole Copper	4.23	Pound Moles Chlorine Consumed to Manufacture CuCl2
150	Kilograms	X	58.00%	=	87 Kilo Au	1.76 Lb Mole Gold	5.29	Pound Moles Chlorine Consumed to Manufacture AuCl3
						Total	9.52	Total Pound Moles of Chlorine for Manufacture of Salts

Calculation of Mole Fractions (Ignore HAUCL4)
200 Gallons at SG 1.3

A Calculation of Total Hydrogen Chloride and Chlorine Dissolved in the Reactor Solution Following the Dissolution Process (Solubilities are taken from empirical studies)

Solution V		Water Dens		Solution		Concentra		MW				Mole Frac
Gallons		Lbs/Gallon		Specific Grav		%		MoleWt lb/mole				of Solute
HCL	200	X	8.3	X	1.3	X	15.0000%	/	36.5	=	8.868 Moles HCL	8.025%
Cl2	200	X	8.3	X	1.3	X	0.3000%	/	71.5	=	0.091 Moles Cl2	0.082%
H2O	200	X	8.3	X	1.3	X	84.7000%	/	18	=	101.546 Moles H2O	91.893%
											110.505 Total Moles Total	100.000%

A Calculation Utilizing Raoult's Law to Predict Concentration of Gaseous Components in Reactor Head Space Above Liquid Level (958 mm Mercury internal vessel pressure)

Partial Pressure				Percent Volume	
4.100	/	958.100	=	0.43%	HCL
700.000	/	958.100	=	73.06%	Cl2
254.000	/	958.100	=	26.51%	H2O
958.100				1	

A Calculation of the Effluent from the Reactors That is From the Head Gas and The Soluble Gases That Are Removed With Purge Air From the Reactor Content

A Calculation to Determine the Amount of HCL and CL2 Gas in the Reactor Above the Solution Level That Ultimately Is Emitted to Scrubber During Purge Cycle

	Compostion		Void Above Solution		Gallons/CuFt		CuFt/Lb Mole		Molecular Weight Lbs/ Mole		Grams per Lb		Grams of Gas in Reactor Headspace
HCl	0.43%	X	175 Gallon Void	/	7.48		377	X	36.5	X	454	=	4.4
Cl2	73.06%	X	175 Gallon Void	/	7.48		377	X	71	X	454	=	1461.5
H20	26.51%	X	175 Gallon Void	/	7.48		377	X	18	X	454	=	134.4

A Calculation of the Maximum Concentration of Chlorine and Hydrogen Chloride Gases That Will be Emitted to The Scrubber (by percent of volume)

Basis: 2 Cubic Feet Per Minute to the Scrubber During the Purge CycleEvent (4 per day)

			gal/cuft		gal head space		Head pressure mm hg		Atm Press mmhg		Max Grams in purge	
HCl	2 cuft	*	7.48	/	175	*	958	/	760	4.4	0.47	Grams in Eff
Cl2	2 cuft	*	7.48	/	175	*	958	/	760	1461.5	157.49	per minute
H20	2 cuft	*	7.48	/	175	*	958	/	760	134.4	14.49	

A Calculation of the Maximum Concentration of Chlorine, Sulfur Dioxide and Hydcrogen Chloride Gases That Will Be Emitted from Scrubber to Environment

HCl	0.47	Grams	/	454	Grams/lb	/	36.5	lbs / Lbmole	377	CuFt/Lbmole	0.011 CuFt Emitted Per Minute to Scrubber
Cl2	157.49	Grams	/	454	Grams/lb	/	71	lbs / Lbmole	377	CuFt/Lbmole	1.842 CuFt Emitted to Scrubber

Sulfur dioxide effluent to scrubber is 5020.9 pounds per day at a utilization of 95% in a precipitation vessel.

SO2	14.49	Grams	/	454	Grams/lb	/	64	lbs / Lbmole	377	CuFt/Lbmole	0.188 CuFt Emitted to Scrubber

Maximum Concentrations Emited from Scrubber

HCl	0.01	Cu/ft	/	8000	*	1000000	1.35	*	0.01	0.01 PPM	HCl	Emit FROM Scrubber
Cl2	1.84	Cu/ft	/	8000	*	1000000	230.24		0.01	2.30 PPM	Cl2	
SO2	0.19	Cu/ft	/	8000	*	1000000	23.50		0.01	0.23 PPM	SO2	
Total	2.04											

A Calculation of the Average Concentration of Chlorine, Sulfur Dioxide and Hydrogen Chloride During an Operating Year

Basis; All Emissions of Chlorine and Hydrochloric Acid to the Scrubber are From the 375 Gallon Reactor Volume, Both Soluble Gases During the Purge and From Headspace After Reaction
All Emissions of Sulfur Dioxide are from Precipitation Vessel

1. Gases in Headspace (From Aforementioned Calculations)

	Grams In H				Events/Day		365 Days/Yr						
HCl	4.4	/	454	X	4	X	365	/	36.5	*	377	146.1713719	Cuft/yr
Cl2	1461.5	/	454	X	4	X	365	/	71	*	377	24956.08789	

2. Gases During Air Sparge to Scrubber (one hour duration) and General Ventilation

HCl	4.100 mm	/	958 mm	*	2	CuFt	X	60	X	4	X	365	749.8	Sparging
	4.100 mm	/	958 mm	*	10	CuFt	X	60	X	20	X	365	18745.3	General Ventilation
													19495.1	Total CuFt To Scrub

Total Chlorine In the System Includes This Dissolved Chlorine Gas in Solution Destined to Be Purged During the Sparging Cycle

Cl2	0.091 lb Mole Cl2	X	335 Cuft/Lbmole	X	4	X	365	=	44285.78182	Chlorine Purged from Solution CuFt
---	---	---	---	---	---	---	---	---	---	---

3. Total Gases Emitted To Scrubber Annually and Emissions to Environment

	Sparging	Head Space		ACFM		Min/Hr		Hr/Yr		PPM		Concentration TO Scrubber	
HCl	19495.1	146	/	8000	/	60	/	8760	X	1000000		4.671	HCl PPM TO SCRUB
Cl2	44285.78182	24956	/	8000	/	60	/	8760	X	1000000		16.467	Cl2
SO2	29571.5	0	/	8000	/	60	/	8760	X	1000000		7.033	SO2

SO2 Utilisation is 95%
Stoichemetric ratio is approximately 3.0 to 2.0 SO2 : Au

2 HAuCl4+ 3SO2 + 6H2O = 2 H2SO4 + 8 HCl + 2Au

Troy Ounces	MW		Ratio	Mw											
3000000	196.7		1.5000	64		100401.74									
			5% of total =			5020.09	Approx Fugitive to Scrubber								
						50.20	lbs/yr @99% Effy	/	ACFM	8000	/	60	/	8760	/

64	X	377		1000000	
			=	0.070327842	

Average Concentrations Emitted from Scrubber

4.671E-02 Average PPM Emission From Scrubber to Environment HCL
1.647E-01 Average PPM Emission From Scrubber to Environment Cl2
7.033E-02 Average PPM Emission From Scrubber to Environment SO2

A Calculation of Maximum Annual Emissions of Chlorine, Hydrogen Chloride and Sulfur Dioxide

HCl	4.671E-02	/	1000000	X	8000	X	60	X	8760	/	377	X	36.5				19.0 Lbs
Cl2	1.647E-01	/	1000000	X	8000	X	60	X	8760	/	377	X	71				130.4 Lbs
SO2	7.03E-02		1000000	X	8000	X	60	X	8760	/	377	X	64				50.2 Lbs

Annual Emissions from Scrubber

ACFM Min hr/yr ft3/lb-mole lb/mole

Scrubber Characteristics

Diameter	6	Feet
CA	28.26	SF
KgA of Packing 2"	2.06	lbmole/hr X Ft3 X atm

Hog 1.33 Ft From Manufacturer ;"Jerry" at Tri-Mer Engineering
6.02 No of Theo stages

						after cont												
HCl before Control	1901.61	lbs annum	19.02	/	8760.00	/	60	/	8000	X	35.3	X	454/1000000	72.48	HCL	UG/DCM
per hr	0.22	lbs	0.002								Cuft/CM					
Cl2 before Control	13040.25	lbs annum	130.40		8760.00	/	60	/	8000	X	35.3	X	454/1000000	497.02	Cl2	UG/DCM
per hr	1.49	lbs	0.01								Cuft/CM					
SO2	5020.09	lbs annum	50.20		8760.00	/	60	/	8000	X	35.3	X	454/1000000	190.57	SO2	UG/DCM
per hr	0.57	lbs	0.01								Cuft/CM					

Humidity

Psychometric 100% RH 0.040 Lbs H2O / Lb Dry Air @100 Deg F

8000	/	375	Ft3/lb Mole	X	0.93	= 19.75 Lb Mole Total
ACFM						

Ratio is 15.1 Cu Ft Air to 1 Cuft Water

8000	/	16.1	=	496.89	Cu Ft H2O	Check	23.85 lbs water
				7503.11	Cu Ft Air		596.25 lb Air

Pounds per minute water to scrubber = 23.8509317 lbs
(water as moisture in air stream)

Ratio is 0.04 Lb H2O/Lb Air

Cushing, Thomas (DEP)

From: Winkler, John (DEP)
Sent: Wednesday, September 29, 2004 4:32 PM
To: Poudrier, Mark (DEP); Cushing, Thomas (DEP)
Subject: FW: Metalor, temperature, residence time, and the incinerator policy

Mark & Tom, please be advised that it is acceptable to operate this incinerator at 1600 oF. Don Squires, Bob Donaldson, Craig Goff and Tom Cusson all support our recommendation. I didn't hear back from Jim Belsky as of yet but I feel confident that our recommendation is well supported by the facts and agreed with by all the others listed above.

Tom, thank you for put just the right amount of details in your original e-mail. I believe it is those facts that brought clarity to the issue so that we received quick feedback. Great job. Thanks

-----Original Message-----
From: Squires, Donald (DEP)
Sent: Wednesday, September 29, 2004 4:17 PM
To: Winkler, John (DEP)
Subject: RE: Metalor, temperature, residence time, and the incinerator policy

Looks good. Sorry, I had a meeting at 1:00 that I was scrambling to get ready for and couldn't take the time this morning.
-----Original Message-----
From: Winkler, John (DEP)
Sent: Wednesday, September 29, 2004 10:20 AM
To: Squires, Donald (DEP)
Cc: Cushing, Thomas (DEP); Belsky, James (DEP); Cusson, Thomas (DEP); Goff, Craig (DEP); Poudrier, Mark (DEP)
Subject: RE: Metalor, temperature, residence time, and the incinerator policy

Don, my read of the incinerator policy reveals that it does not require incinerators to be operated at 1800 oF and I concur that the subject incinerator be approved to operate at 1600 oF since I also believe it is not subject to the policy. My conclusion is based upon:

1) The proposed incinerator meets the policy's secondary chamber design residence time of 1.15 seconds at 1800 oF ("V. **Design Requirements:** A. Secondary Chamber must provide for a combustion gas retention time of a minimum of one second at 1800 oF.").

2) The policy in Section **VI. Operational Requirements** does not require a minimum secondary chamber temperature.

3) The extremely long average residence time (9.7 seconds) and the exceptionally low particulate emission limit (0.0047 gr/dscf@12% CO2).

4) Operating at 1800 oF versus 1600 oF may result in greater particulate release from the secondary chamber per their vendor.

5) Operating at 1800 oF versus 1600 oF will result in higher NOx & CO emissions.

6) The incinerator will be used for precious metals, primarily silver, recovery from a wide variety of wastes from a wide variety of customers that may including floor sweepings, electronic boards, etc. and may not be applicable at all to the policy since it may be a "Special Incinerator" by definition that burns other than infectious, etc. waste per the Policy **I. GENERAL.** Furthermore, it is not a Commercial or Industrial Incinerator by definition since the waste is received from other than the "establishment" that will own & house the incinerator.

I'll hold off on responding to the staffs questions on this matter until you have an opportunity to comment.

-----Original Message-----
From: Poudrier, Mark (DEP)
Sent: Tuesday, September 28, 2004 6:11 PM
To: Winkler, John (DEP)
Cc: Cushing, Thomas (DEP)
Subject: FW: Metalor, temperature, residence time, and the incinerator policy

"For Use in Intra-Agency Policy Deliberations"

John, based on my review of the Incinerator Policy No. 90-005 language, I agree with Tom's position.

It appears the Metalor incinerator secondary chamber WILL provide for a comb gas retention time of at least 1.0 second at 1800 F.

I did NOT find Policy language requiring the incinerator to operate at 1800 F all the time, so I feel Metalor's proposal to operate @ 1600 F does NOT conflict with the Policy as written.

Also, I'll note that some where down the road, a proponent could make an argument that a metals recovery incinerator should be classified as a "Special" Incinerator (according to 7.00 definition), NOT "Commercial or Industrial" Incinerator.

If classified as a "Special (non infectious or physically dangerous medical or biological waste) Incinerator, the Policy would NOT apply at all.

I'm not saying I'd agree with that tact, but it would have to be looked at carefully, along with DEP past practice on permitting precious metal recovery incinerators.

Please let me know your position on the Metalor proposal.

Thanks.

Mark R. Poudrier, DEP SERO

-----Original Message-----
From: Cushing, Thomas (DEP)
Sent: Tuesday, September 28, 2004 10:58 AM
To: Poudrier, Mark (DEP)
Subject: Metalor, temperature, residence time, and the incinerator policy

For Use in Intra-Agency Deliberations

I am reviewing Metalor's application for a precious metal reclamation incinerator at their North Attleboro facility. The unit, as proposed, meets all requirements of the incinerator policy - with the exception of the minimum residence time / temperature requirements of the secondary chamber.

The Department incinerator policy states the "Secondary chambers must provide for a combustion gas retention time of a minimum of one second at 1800°F." The proposed unit's secondary chamber will have a 1.1 second minimum residence time at 1800°F, so one may argue that they do comply with the policy. However, it has been the Department's practice to view the residence time and temperature as two distinct and separate minimums. Metalor will only achieve 1800°F in the secondary chamber under extreme operating conditions, when the boost burner is firing. Metalor is proposing a 1600°F minimum temperature where the secondary chamber will have a minimum residence time of 1.15 seconds and an average residence time of 9.7 seconds.

The purpose of the policy's residence time / temperature requirement is to ensure adequate destruction of particulate. The policy indicates that a PM emission rate of 0.02 grains/DSCF @ 12%CO_2 is reasonable (for infectious or physically dangerous medical or biological waste). Metalor has proposed a PM emission rate of 0.0047 grains/DSCF @12% CO_2. This low emission rate will be achieved with the use of a quench chamber / cyclone / scrubber train that will have an overall PM control efficiency of 99%.

Any improvement in PM destruction associated with the higher temperature will likely be nominal, particularly after control. Any reduction in PM will be more then offset by the increase in CO and NOx associated with the increased fuel consumption at the higher operating temperature. Furthermore, Metalor's vendor claims that the turbulence created by the increased airflow associated with 1800°F may reduce the amount of product reclaimed.

The intent of the incinerator policy is, in part, to ensure that the emissions from every incinerator represent BACT. Based on the low PM emission rate, the incinerator system as proposed represents BACT for PM. There is no technical merit to requiring a higher temperature in this instance.

The purpose of this email is for concurrence to allow Metalor operate the secondary chamber of the proposed incinerator at a minimum of 1600°F.